LAN Bridge™ 200

digital

Installation

Order Number: EK–DEBAM–IN–001

NOTICE – Class A Computing Device:
This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such radio frequency interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference; in which case, measures taken to correct the interference are at the user's expense.

CAUTION

The people who install the cabling system described in this guide should be familiar with local building codes, fire codes, and any other applicable codes or regulations. The manufacturers or their distributors and agents will not be responsible for damage due to improperly installed cabling, neglect, misuse, or improper connection of devices to the cabling system.

LAN Bridge™ 200

Installation

September 1989

This guide explains how to install the LAN Bridge 200 and how to verify its operation. It also describes the LAN Bridge 200 unit's control and indicators. This document is intended for the hardware installer and the system/network manager.

Supersession/Update Information: This is a new manual.

digital

Order Number: EK–DEBAM–IN–001

EK–DEBAM–IN–001
September 1989

The postpaid READER'S COMMENTS form on the last page of this document requests the user's critical evaluation to assist in preparing future documentation.

This manual was produced by Networks and Communications Publications.

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Preface

This guide explains how to install the LAN Bridge 200 hardware unit and how to verify its operation.

The only tools required for installation are a small flat-blade screwdriver and a Phillips-head screwdriver.

You should keep this guide with your LAN Bridge 200.

Intended Audience

This guide is intended for the hardware installer and system/network manager.

How to Use This Guide

Before you install the LAN Bridge 200 unit, it is recommended that you read Chapters 1, 2, and 3. These chapters provide a functional overview of the LAN Bridge 200 and the installation process including important site verification information. Chapter 4 provides the procedures to install and verify the LAN Bridge 200. If problems occur during verification, refer to the troubleshooting procedures in Chapter 5. The appendixes offer additional information that may be useful during installation.

Structure of This Guide

This guide contains five chapters and two appendixes, as follows:

Chapter 1	Provides an overview of the LAN Bridge 200 product.
Chapter 2	Describes the contents of the LAN Bridge 200 shipment and provides instructions for getting help if the equipment is damaged.
Chapter 3	Discusses important site verification information that must be considered before the installation.
Chapter 4	Provides illustrated procedures for installing and verifying the operation of the LAN Bridge 200.
Chapter 5	Provides help in isolating problems that can occur during the installation and procedures to correct them.
Appendix A	Describes the LAN Bridge 200 unit's controls, status LEDs, and connectors.
Appendix B	Lists the LAN Bridge 200 product specifications.

Related Documents

Additional information about the LAN Bridge 200 product can be found in the following documents. Ordering information is provided at the back of this guide.

- *LAN Bridge 200 Problem Solving* (Order No. EK-DEBAM-PS)

  This is a field troubleshooting manual that provides diagnostics for isolating faults to the field replaceable unit (FRU). Removal and replacement procedures are also provided for each FRU.

- *Bridge and Extended LAN Reference* (Order No. EK-DEBAM-HR)

  This guide provides an overview of how bridges operate. The descriptions include the use of bridges in extended LAN configurations, information on LAN interconnections, overall bridge operation, spanning tree, bridge management, and solving bridge related problems in a network.

- *Remote Bridge Management Software Guide* (Order No. AA-FY93C-TE)

  This manual provides the information needed to monitor and control the LAN Bridge 100, LAN Bridge 150, and LAN Bridge 200 models using Remote Bridge Management Software (RBMS).

- *Network Troubleshooting Guide* (Order No. EK-339AA-GD)

  This manual provides an overview of network troubleshooting tools and methodologies, and detailed troubleshooting procedures for specific network problems.

- *DECconnect System Planning and Configuration Guide* (Order No. EK-DECSY-CG)

  This guide contains planning requirements and guidelines for configuring DECconnect System networks and networks that use DECconnect System products. The guide also contains detailed product information for all DECconnect System components.

- *DECconnect System Satellite Equipment Room Installation Guide* (Order No. EK-DECSY-SR)

  This guide describes how to install a DECconnect System SER, including racks, active equipment, and passive patching equipment.

- *DECconnect System Facilities Cabling Installation Guide* (Order No. EK-DECSY-FC)

  This guide provides procedures for properly installing Ethernet coaxial cables, twisted-pair data and voice cables, ThinWire cables, and fiber optic cables within a DECconnect System site. Also included are installation procedures for devices that are directly related to the facilities cabling (such as transceivers and wallboxes).

Additional Networking Documentation

Additional information about networking products can be found in the following document. Ordering information is provided at the back of this guide.

- *Networks and Communications Product Documentation* (Order No. EK-NACPD-RE)

  This guide lists the title and order number for each publication associated with Digital Equipment Corporation's Networks and Communications products.

For a complete list of the available networking products and for more information, see Digital's *Networks and Communications Buyer's Guide.* Customers can receive a catalog by contacting their local sales office.

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1

Overview of the LAN Bridge 200 Product

1.1 Introduction

The LAN Bridge 200 hardware unit (see Figure 1–1), also referred to in this guide as the bridge, is a specialized local area network (LAN) station that connects two IEEE 802.3/Ethernet LANs to form a single extended local area network. You can use the bridge with standard Ethernet/10base5 networks, ThinWire Ethernet/10base2 networks, and with broadband networks.

All stations connected within the extended LAN communicate with one another as if they were all on the same LAN. The connected LANs can be standard Ethernet, broadband Ethernet, ThinWire Ethernet, or IEEE 802.3 compliant LANs, in any combination. Bridge operation is transparent to other stations on the LAN, and no special software is required on any station.

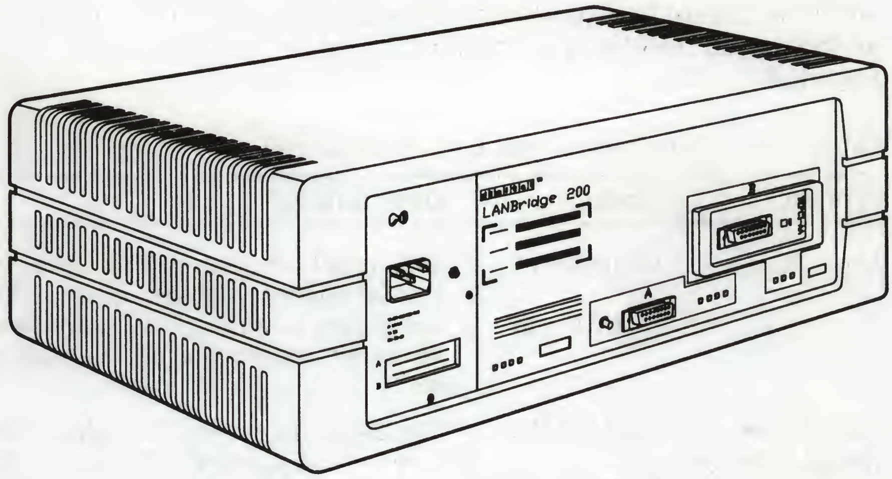
The LAN Bridge 200 unit can be installed in a variety of environments including offices and computer rooms. The unit can be placed on a desk or table, or can be mounted in a standard 48-centimeter (19-inch) RETMA* rack cabinet. Digital Equipment Corporation can also provide you with a wall/partition mounting bracket to mount the unit directly onto an office wall or to suspend the unit from partitioned office walls. (The wall/partition mounting bracket, Order Code H039, must be ordered separately.)

* RETMA racks are standard-sized cabinets that are used by Digital Equipment Corporation and other major manufacturers of electronic equipment. The cabinet rails, mounting hole patterns, and spacing conform to international standards that allow compatibility with products manufactured by Digital and others in the industry.

The LAN Bridge 200 unit provides:

- **Long distance capabilities** — interconnects geographically separate LANs (up to 10 kilometers/6.2 miles) using optical fiber.
- **Full bandwidth efficiency** — provides full 10 Mbits/second Ethernet performance.
- **Destination Address filtering** — filters or forwards packets based on dynamically learned addresses stored in the bridge's address database. Users with Remote Bridge Management Software (RBMS) can enter specific destination addresses into the address database that the bridge will filter.
- **Source Address filtering** — with Remote Bridge Management Software (RBMS), users can filter packets based on their source address, regardless of their destination address or protocol type.
- **Protocol filtering** — with Remote Bridge Management Software (RBMS), users can filter packets based on their protocol type, regardless of their destination address or source address.
- **Protocol transparent, multivendor communications** — provides connectivity between two network segments regardless of vendor hardware or software, provided that the hardware and software conform to IEEE 802.3 and Ethernet compliance requirements.
- **Connectivity** — the LAN Bridge 200 is an IEEE 802.3/Ethernet device and can be used in networks that are IEEE 802.3, standard Ethernet, or ThinWire Ethernet compliant.
- **Integral ThinWire connection** — provides a physical and electrical interface to a ThinWire Ethernet coaxial cable.
- **Loop detection and automatic back-up (Using Redundant Bridges)** — increases availability and reliability of the network by using either Digital's LAN Bridge 100 implementation of the Spanning Tree algorithm, or the IEEE 802.1 implementation of the spanning tree algorithm.
- **Automatic self-test** — automatically initiates a 30-second self-test of the bridge basic functions at power up.
- **On-line diagnostics** — automated periodic testing of the LAN Bridge 200 hardware.

Figure 1–1: LAN Bridge 200 Unit



LKG–2769–89A

1.1.1 LAN Bridge 200 Product Designations

There are three versions of the LAN Bridge 200 product, one local bridge version and two remote bridge versions. Each version has two models and is designated by the model number as described in Table 1–1. The three versions are shown in Figure 1–2.

Table 1–1: Versions of the LAN Bridge 200

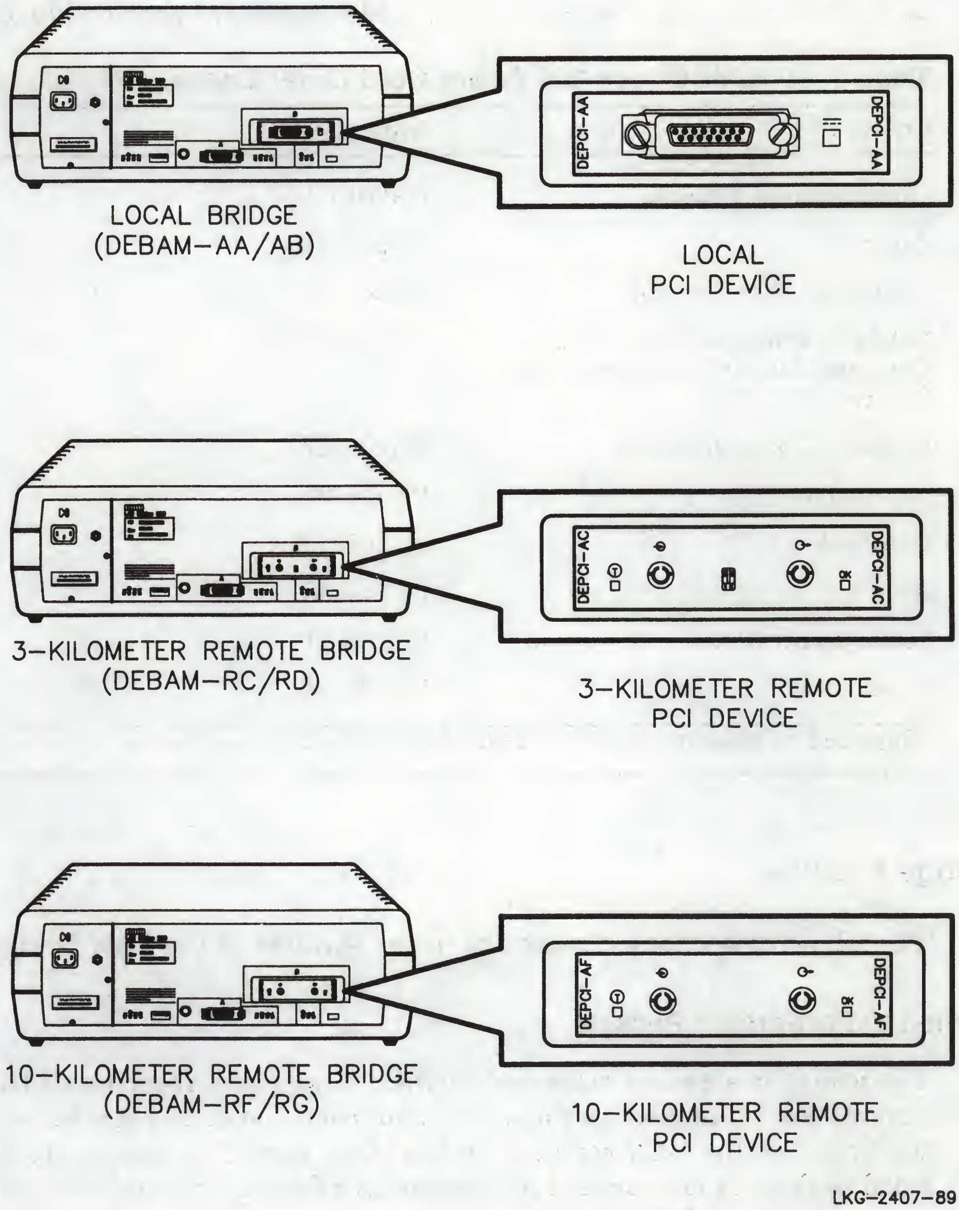
Version	Model	Description
Local Bridge	DEBAM-AA DEBAM-AB*	The local bridge is used to connect LANs separated by 100 meters (328 feet) or less. The distance from the bridge to either LAN cannot exceed the maximum allowable transceiver cable length of 50 meters (164 feet).
3-kilometer Remote Bridge	DEBAM-RC DEBAM-RD*	The 3-kilometer remote bridge provides 14 dB of usable optical power at 850 nanometers. This model can achieve distances of up to 3 kilometers (1.9 miles) when connecting two DEBAM-RC/RD units, or up to 1.5 kilometers (0.93 miles) when connecting to a DECrepeater 200 remote repeater (DEREN-RC/RD). The actual achievable distance is dependent on the cable plant. See Section 3.5.1 for details of the DEBAM-RC/RD optical system.
10-kilometer Remote Bridge	DEBAM-RF DEBAM-RG*	The 10-kilometer remote bridge provides 17 dB of usable optical power at 1300 nanometers. This model can achieve distances of up to 10 kilometers (6.2 miles) when connecting two DEBAM-RF/RG units using 62.5/125 micron fiber. The actual achievable distance is dependent on the cable plant. Connection to a remote repeater is not permitted. See Section 3.5.2 for details of the DEBAM-RF/RG optical system.

*Power cord not supplied, voltage select switch factory set for 240 Vac operation (refer to Table 1-2 to order power cord).

1.1.2 Voltage Select Switch

The voltage select switch (refer to Section A.2) is used to set the bridge's ac input voltage to the range required for operation in your country. This switch was factory set for 120 Vac operation or for 240 Vac operation, depending on the model you ordered. Do not change this switch setting unless you are sure that the switch setting is incorrect (see your electrician if you are not sure). Section 4.2.1 provides information about changing the switch setting, if necessary.

Figure 1–2: Local and Remote LAN Bridge 200 Units



1.1.3 Country Power Cords

For use outside the United States a[illegible]nada, the LAN Bridge 200 unit requires a country-specific power cord. [illegible]rder codes are provided in Table 1–2.

Table 1–2: LAN Bridge 200 Power Cord Order Codes

Country	Order Code
United States, Canada	BN20A-2E*
Japan	BN20B-2E
Australia, New Zealand	BN20C-2E
Belgium, Finland, France, West Germany, Holland, Norway, Spain, Sweden	BN20D-2E
Ireland, United Kingdom	BN20E-2E
Switzerland	BN20F-2E
Denmark	BN20H-2E
Italy	BN20J-2E
India, South Africa	BN20K-2E
Israel	BN20L-2E

*Supplied in shipping box with DEBAM-AA/RC/RF models only.

1.2 Bridge Features

The following sections discuss the major features of the LAN Bridge 200 unit.

1.2.1 Filtering/Forwarding Packets

The bridge is a packet store-and-forward device that receives all IEEE 802.3/Ethernet packets and, if necessary, forwards them from the LAN segment on one side of the bridge to the LAN segment on the other side. The decision to filter or forward packets is determined by the packet's destination address, source address, or protocol type as follows:

- To perform Destination Address Filtering — the bridge, upon receiving a packet, scans its address database which contains RBMS-set entries and entries that are dynamically learned by the bridge. The packet's destination address is compared with known addresses in the database. If no source address filters or protocol type filters are enabled (by RBMS) for the packet,

the bridge makes its decision to filter the packet based on the packet's destination address. Otherwise, the packet is subjected to source address or protocol type filtering.

- To perform Source Address Filtering — a user with Remote Bridge Management Software (RBMS) can specify source addresses of packets that the bridge will filter, regardless of their destination address or protocol type. This prevents user-specified nodes on one side of the bridge from communicating with nodes on the other side of the bridge.

- To perform Protocol Filtering — a user with RBMS can specify protocols that the bridge will filter, regardless of the packet's source address or destination address. This allows a user to isolate incompatible protocols to particular LAN segments.

Refer to the *Bridge and Extended LAN Reference* manual for more information about filtering and forwarding packets. Chapter 6 of that manual provides examples of how bridges use these filtering features to solve various extended LAN problems.

1.2.2 Self-Learning Algorithm

While filtering the packets, the bridge dynamically learns the locations of the nodes in the network and uses this information to build its database of station addresses that are associated with each of its ports.

1.2.3 Transparent Operation

The bridge operates at the physical and data link layers of the ISO model and is therefore protocol independent and transparent to any higher level protocols that might exist on the network. Both Digital and non-Digital devices in the network configuration can utilize the communications capabilities of the LAN Bridge 200 unit.

1.2.4 Automatic Self-Test

The self-test initiates automatically whenever the bridge is powered up from a powered off state. The self-test confirms that the basic bridge functions are operational (or non-operational) and sets the appropriate status LEDs to indicate the status.

1.2.5 On-Line Diagnostics

On-line diagnostics execute as low priority background tasks under the LAN Bridge 200 operating system. The diagnostics are executed during null time, while no other higher priority tasks are scheduled. The on-line diagnostics greatly increase the LAN Bridge 200 unit's reliability by quickly diagnosing hardware failures that affect system operations. The result is less unit down time, and therefore, increased system availability.

1.2.6 Loop Detection and Automatic Backup (Using Redundant Bridges)

A loop is a condition that exists when misconfigured bridges provide multiple paths between two LANs. Such a loop, if not corrected, could cause the network to become saturated with the same packet repeatedly sent around the loop.

The LAN Bridge 200 prevents this type of network misconfiguration by automatically setting up a spanning tree topology (refer to Section 1.3). The spanning tree topology ensures that packets do not loop and only a single copy of a packet is delivered to each LAN.

The LAN Bridge 200 determines if there are any loops by communicating with other Digital or IEEE 802.1 compliant bridges in the network. If a loop is detected, one of the bridges becomes the designated packet forwarder, and the other bridge automatically enters the backup state. When in the backup state, a bridge does not forward any packets, instead, the backup bridge constantly monitors the designated bridge. When a backup bridge detects a failure, it automatically begins a procedure to take over packet forwarding.

1.3 Spanning Tree Algorithm

This section explains the automatic process (the spanning tree) used by the LAN Bridge 200 for configuring itself into a logical, loop-free network. The spanning tree is developed automatically by an algorithm resident in each LAN Bridge 200 unit; no network management is required to configure the network. This process provides the following two features which simplify the management of your network:

- Loop Detection — If a loop is detected, the process computes and implements a loop-free network topology. This process prevents packets from circulating through the network indefinitely.
- Automatic Backup (using redundant bridges) — Users can deliberately configure bridges in a loop in such a way that one bridge in the loop can serve as the backup for any of the other bridges in the loop.

1.3.1 Spanning Tree Algorithm Properties

Although the bridges in an extended network can be placed in an arbitrary fashion, the logical network that bridges automatically create (due to the algorithm) is always a spanning tree with the following properties:

- There are no loops; that is, there is only one path between bridges.
- All LANs are connected.

The process by which the bridges construct the logical spanning tree is called the Spanning Tree Computation Process (refer to the *Bridge and Extended LANs Reference* guide for more detailed information about the spanning tree process).

1.3.2 Compatibility with Existing IEEE 802 Standards

The spanning tree computation process developed by Digital Equipment Corporation was first implemented in Digital's LAN Bridge 100 product. This Spanning Tree algorithm was offered to the IEEE and has now been adopted by the IEEE as part of the IEEE 802.1 Part D, MAC Bridging Standard.

Although the algorithms are identical and produce exactly the same spanning tree topologies, the IEEE implementation of the Spanning Tree algorithm uses several different parameters for international standardization of the algorithm. Specifically, the multicast address (for the Bridge "hello" message) used by the LAN Bridge 100 spanning tree implementation is from Digital's assigned address block. The multicast address used by the IEEE spanning tree implementation is from IEEE's assigned address blocks. IEEE chose the multicast address from the block of address used for standardized protocols. This is a natural process for the creation of an international standard.

The LAN Bridge 200 (and the LAN Bridge 150) can run either the LAN Bridge 100 implementation of the Spanning Tree algorithm, or the IEEE implementation of the Spanning Tree algorithm. This unique capability provides a migration path to the IEEE standard or allows for no modification of the existing Digital bridge in the current installed base.

1.4 LAN Bridge 200 Network Interfaces

The network interface for the LAN Bridge 200 unit consists of two ports: A and B. The ports (and all LEDs, switches, and connectors) are located on the bridge I/O panel:

- Port A supports both an AUI (15-pin standard) transceiver interface and a ThinWire interface. Either interface can be selected by setting the configuration switch to the appropriate position, see Appendix A.
- Port B supports a standard AUI transceiver interface for the local bridge version (DEBAM-AA/AB), or a fiber optic interface for the remote bridge versions (DEBAM-RC/RD and DEBAM-RF/RG).

NOTE

Port B of the remote version bridge is configured with a fiber optic interface for remotely connecting to another remote version bridge. Port A is common to both local and remote version bridges.

1.4.1 IEEE 802.3/Ethernet AUI Interface

The Port A (AUI connector) and the Port B connector (for local bridge units DEBAM-AA/AB) connect to the LANs using transceiver cables for the connection to the appropriate network interface device.

NOTE

IEEE 802.3 transceiver cables and Ethernet transceiver cables cannot be interconnected.

The transceiver cable can be connected to any of the following:

- Another transceiver cable section. This section can be secured in an Etherjack junction box.
- A DELNI local network interconnect.
- A transceiver (H4000/H4005 or IEEE 802.3/Ethernet) on a standard 802.3/Ethernet coaxial cable for baseband networks, or to a Chipcom Ethermodem broadband Ethernet transceiver with AUI ECHO MODE disabled.
- A ThinWire Ethernet Station Adapter (DESTA) on a ThinWire Ethernet coaxial cable.

1.4.2 ThinWire Ethernet Network Interface

Port A supports both a standard AUI transceiver interface and a ThinWire Ethernet network interface. Either interface can be selected by setting the configuration switch to the appropriate position. (Appendix A provides configuration switch settings.)

When the configuration switch is set to select the ThinWire Ethernet network interface, Port A provides a physical and electrical interface to a ThinWire Ethernet coaxial cable. The ThinWire Ethernet coaxial cable connects to the bridge via a ThinWire T-connector with appropriate terminators installed. (The ThinWire T-connector and terminators are provided with your LAN Bridge 200 shipment.)

1.4.3 Fiber Optic Network Interface

The fiber optic network interface for remote bridges is via Port B. Two ST-type connectors are provided for connecting the fiber optic cable to the bridge: one for transmit, and the other for receive.

The remote version LAN Bridge 200 units (DEBAM-RC/RD or DEBAM-RF/RG) can be paired, model-to-model, for connecting two LANs together in a bridge-to-bridge link using fiber optic cable. The DEBAM-RC/RD can also connect to a remote DECrepeater 200 (DEREN-RC/RD).

1.4.4 Connectivity

The LAN Bridge 200 can be connected to any of the previously described network interface devices in various combinations and configurations. Section 1.5 of this guide provides configuration examples. Chapter 3 describes various cable types that can be used with your LAN Bridge 200 and also provides basic configuration rules governing their use.

For a summary of all the configuration guidelines to follow when configuring either DECnet networks or networks that use DECconnect System products, see the *DECconnect System Planning and Configuration Guide.*

1.5 LAN Bridge 200 Configurations

For packet traffic purposes, LANs connected by bridges are considered one extended LAN. For all other configuration purposes, LANs connected by bridges are considered separate; therefore, each of these LANs can be configured up to the standard maximum amount for length, number of stations, and other LAN related specifications.

NOTE

When routers are connected to an extended LAN, ensure that the total number of routers in the extended LAN does not exceed the maximum allowed for a single LAN.

The following sections provide examples of configurations that utilize the LAN Bridge 200 product. Chapter 3 of this guide describes the cables that are available to support your configuration, and also provides cable configuration rules for their use.

For more information about configuring bridges and LANs, refer to the *DECconnect System Planning and Configuration Guide.*

NOTE

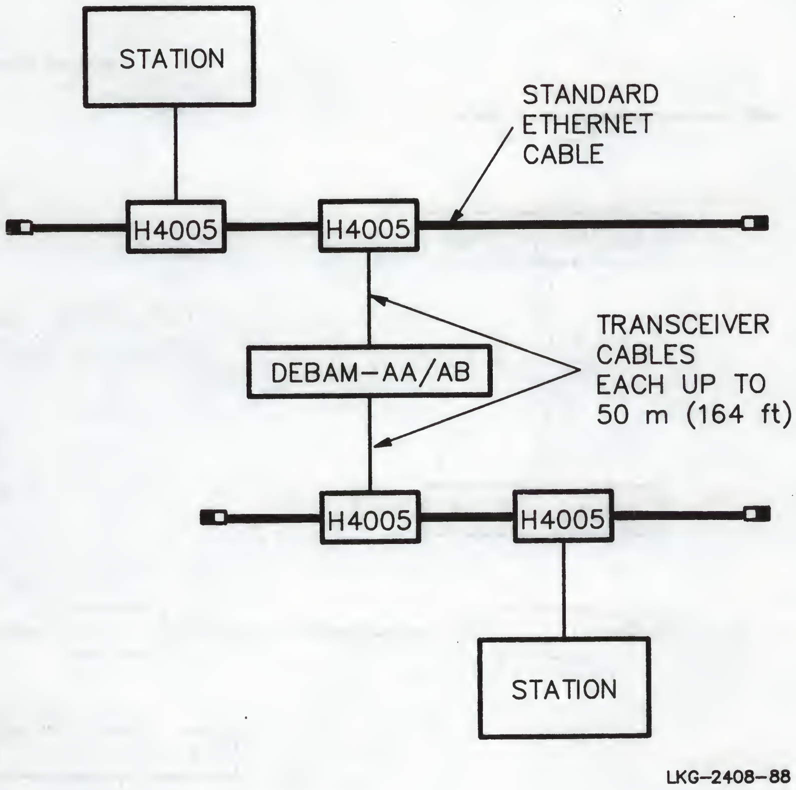
The fiber optic links, shown in the following examples, between the remote bridge (DEBAM-RC/RD) and the remote DECrepeater (DEREN-RC/RD) should not exceed 1.5 kilometers (0.93 miles).

The maximum length allowed for the bridge-to-repeater fiber optic link is calculated by adding 500 meters (1640 feet) to the maximum fiber optic link length allowed for repeater-to-repeater links (1000 meters [3280 feet]). Certain configurations on the repeater side of the link can affect these parameters. For more detailed information on bridge-to-repeater configurations, refer to the *DECconnect System Planning and Configuration Guide*.

1.5.1 Local LAN Configuration

Figure 1–3 shows a local LAN Bridge 200 (DEBAM-AA/AB) connecting two LANs that are separated by fewer than 100 meters (328 feet). This is the maximum combined length of the local LAN Bridge 200 unit's transceiver cables, each of which can measure up to 50 meters (164 feet).

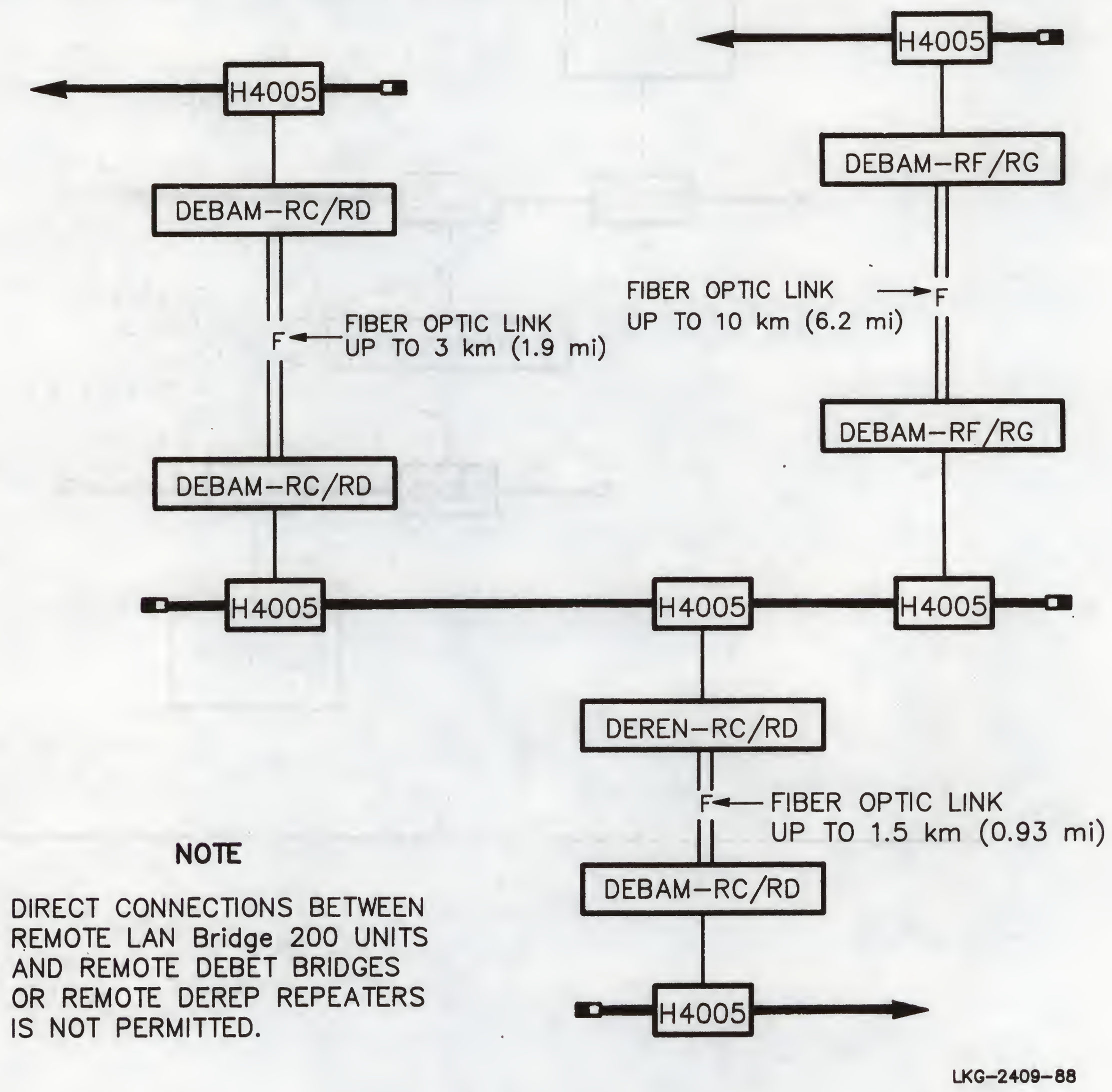
Figure 1–3: DEBAM-AA/AB Configuration



1.5.2 Remote LAN Configuration

Figure 1–4 shows remote LAN Bridge 200 versions (DEBAM-RC/RD and DEBAM-RF/RG) connecting LANs separated by more than 100 meters (328 feet). Note the use of each model for efficiently connecting the distant LANs, and the fiber optic length restrictions that apply when connecting to a remote DECrepeater 200 (DEREN-RC/RD).

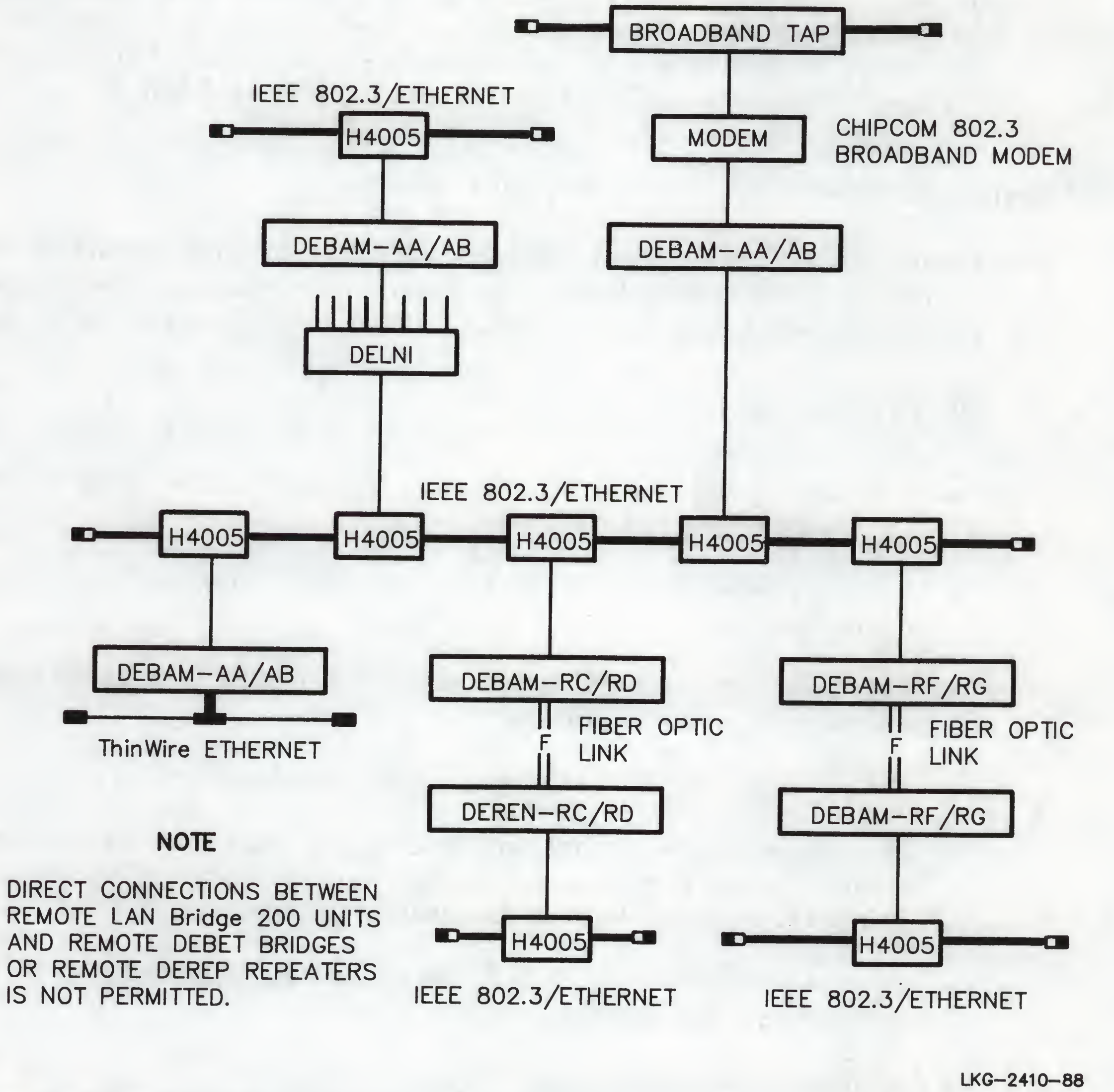
Figure 1–4: DEBAM-RC/RD and DEBAM-RF/RG Configuration



1.5.3 Mixed Media Configuration

Figure 1–5 shows transceiver cables connecting bridges to various network interconnect devices.

Figure 1–5: LAN Bridge 200 Connections



1.6 Network Performance Consideration

There is no physical limit to the number of bridges that a packet can travel through before reaching its destination station. If a packet must travel through many bridges, however, network performance can be adversely affected. Network delay is particularly noticeable with interactive tasks such as character echoing for users on terminal servers. A guideline for networks with typical packet traffic loading (less than 40% maximum) is to limit the number of bridges between any two stations to seven. This guideline is a compromise of the many different protocols offered and used on Ethernet and IEEE 802.3 LANs.

1.7 Remote Bridge Management Software (RBMS)

Remote Bridge Management Software (RBMS) is an optional product that is available for VMS hosts. RBMS significantly enhances the network's operation by allowing you to observe and control bridges and other network devices.

RBMS allows you to:

- Understand and modify your network topology by displaying and modifying the bridge forwarding database.
- Evaluate network performance by displaying bridge counters, status, and characteristics.
- Set the bridge's forwarding database to filter packets by destination address, source address, or by protocol type.
- Set priority level for spanning tree root determination.
- Troubleshoot network problems by understanding your network topology, disabling selected bridges to segment your network, and signaling selected bridges to run their built-in diagnostic self-tests.
- Save your configuration data in the bridge's nonvolatile RAM (NVRAM) so that it is not lost during a power failure.
- Observe network utilization data.

1.8 LAN Bridge 200 Operation

When the LAN Bridge 200 is powered up, it runs its built-in diagnostic self-test, which lasts for about 30 seconds. The bridge then initiates the procedure to participate in a spanning tree with other bridges on the network to eliminate loops in the topology (refer to Section 1.3). This procedure usually takes about 30 seconds for completion. Some of this time is also used to monitor network traffic in order to build a forwarding database before the traffic is actually forwarded. Refer to the *Bridge and Extended LAN Reference* guide for more detailed information about the Spanning Tree algorithm resident in each LAN Bridge 200.

If two bridges are in a loop with each other, one of them will become a backup bridge. The backup bridge will not forward traffic but will monitor the other bridge (which is forwarding traffic). If the forwarding bridge fails, the backup bridge will take over and start forwarding packets after 45 seconds.

If a LAN Bridge 200 is in a loop with a repeater, or if both of its links are connected to the same LAN, it will not forward traffic, but will monitor this loop. If the repeater is then removed, the bridge will start forwarding traffic within 45 seconds.

NOTE

Use caution when configuring a bridge in a loop with a router. If the bridge protocol filtering is not properly set up, degradation of network performance could result. Refer to the *Bridge and Extended LAN Reference* for more information.

Digital does not recommend the use of a non-Digital IEEE 802.1 bridge in the same extended LAN with a LAN Bridge 100. These bridges use protocols that are not compatible and degradation of network performance could result.

However, you can use a non-Digital IEEE 802.1 bridge in the same extended LAN with a LAN Bridge 200 because the LAN Bridge 200 automatically compensates and runs the 802.1 Spanning Tree algorithm if there are no LAN Bridge 100 units in the extended LAN.

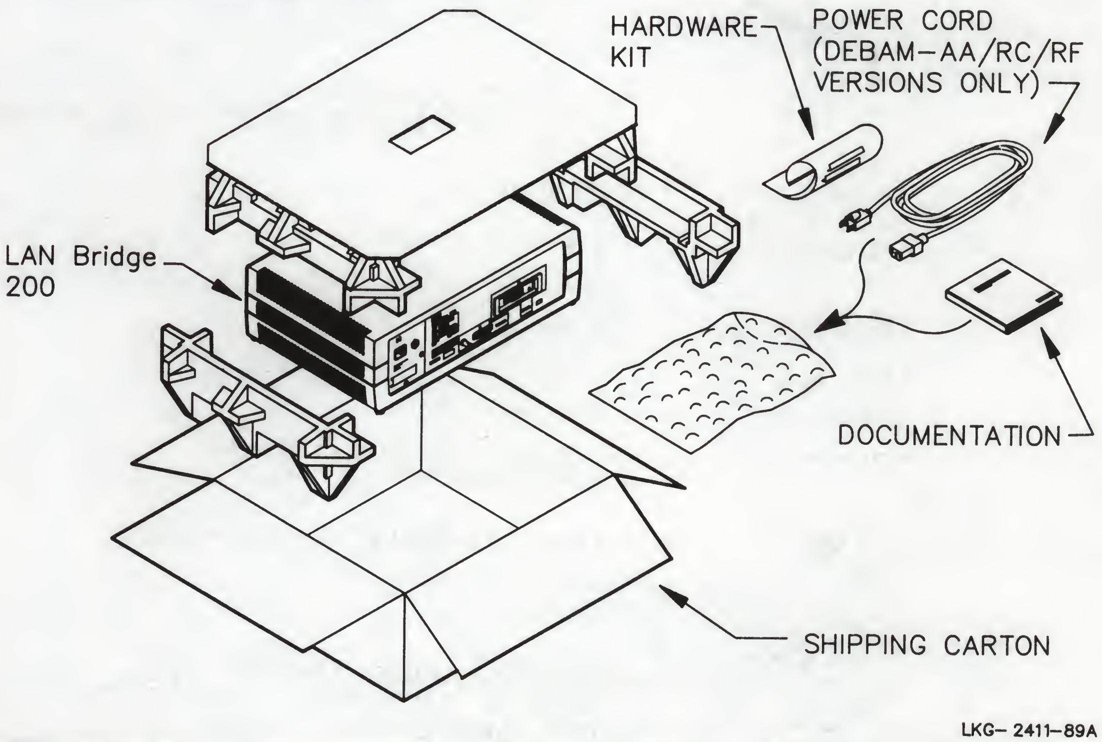
2

Contents of Shipment

2.1 Contents of the LAN Bridge 200 Shipping Box

A single LAN Bridge 200 shipment consists of one or more boxes depending on the optional equipment ordered. Be sure you received all your ordered equipment. The LAN Bridge 200 unit is packaged as shown in Figure 2–1.

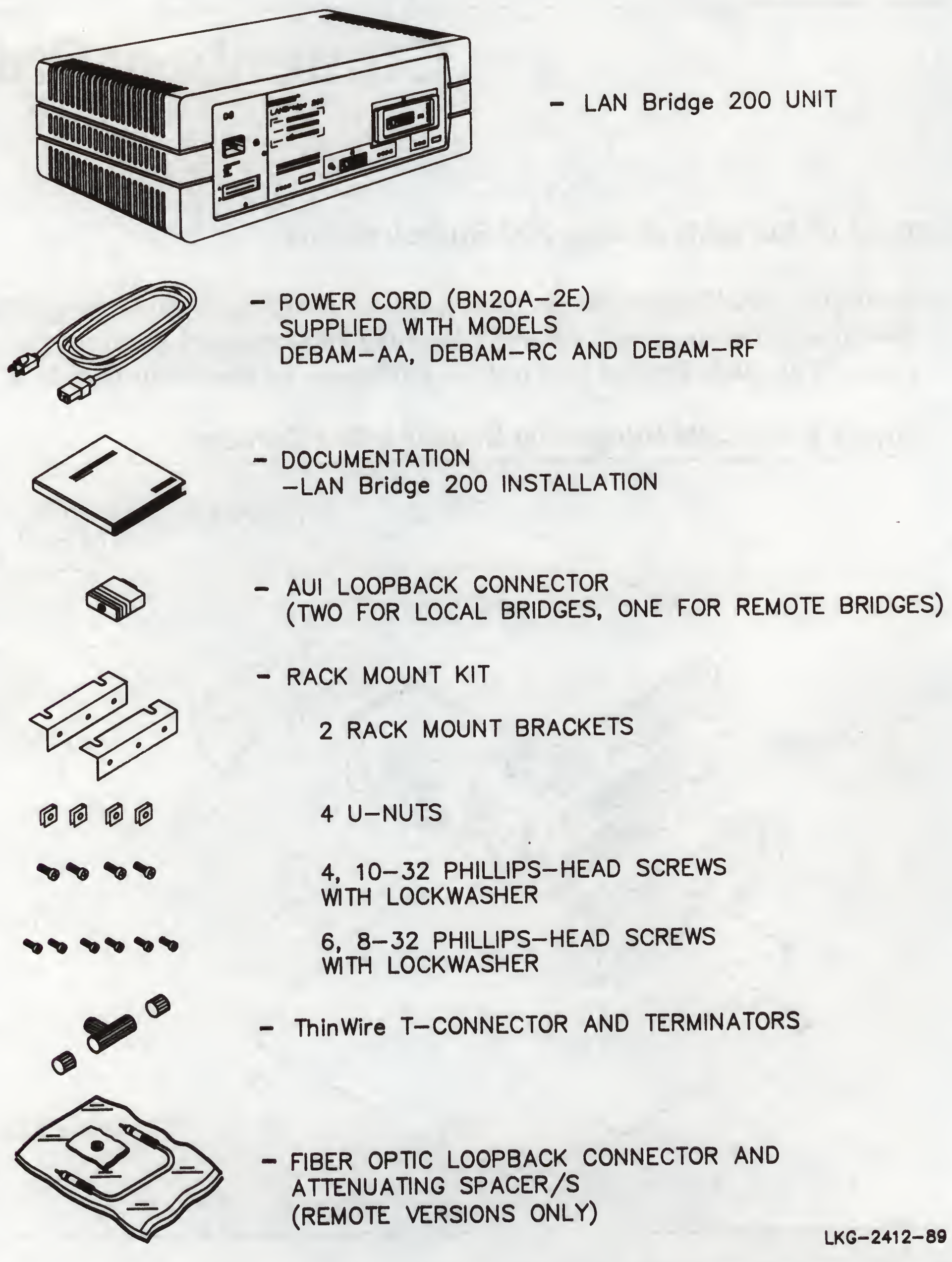
Figure 2–1: LAN Bridge 200 Shipping Box Contents



2.2 Checking Contents of Shipment

Check the shipment for damage and missing parts (see Figure 2–2). In case of damage, contact your delivery agent and your Digital sales representative. In case of missing parts, contact your Digital sales representative.

Figure 2–2: Checking Contents of Shipment



3
Site Verification

3.1 Introduction

This chapter provides instructions for verifying that the installation site meets the bridge's physical, environmental, network cabling, and power requirements.

3.2 LAN Bridge 200 Placement

The bridge can be placed in various locations including offices and computer rooms as long as the environmental requirements are met (refer to Appendix B).

3.2.1 Offices

Allow at least 10 centimeters (4 inches) of airspace around the bridge's air vents, and place the bridge on a desk or table that is at least 45 centimeters (18 inches) above the floor. Doing so allows adequate ventilation for cooling fans and reduces exposure to excess dust from foot traffic.

NOTE

> A wall/partition mounting bracket kit is available from Digital that allows you to mount the bridge directly to a wall or to suspend it from partitioned office walls. Installation instructions are provided with the kit (Order Code H039).

3.2.2 Rack Mount

The bridge can be mounted in a standard 48-centimeter (19-inch) RETMA rack cabinet. Installation instructions are provided in Chapter 4.

3.2.3 Satellite Equipment Room (SER)

The SER is a component of Digital's DECconnect System. It provides a central location for communications devices that connect ThinWire Ethernet and twisted-pair cable to a standard Ethernet network. The SER can also be configured as the center of a stand-alone network and can provide a base from which to expand as network requirements increase. If you are installing the LAN Bridge 200 in such an environment or as part of a DECconnect System installation, refer to the *DECconnect System Satellite Equipment Room Installation Guide*.

3.3 Cable Configuration Rules

Ensure that the transceiver cables, fiber optic cables, and the bridge power cable do not exceed the maximum lengths described in Table 3–1 and in the basic configuration rules that follow.

Table 3–1: Maximum Cable Lengths

From	To	Maximum Cable Length	Cable Type
Transceiver	Bridge	50 m (164 ft), see rules 1 through 5	BNE3x-xx* transceiver cable
Transceiver	Bridge	12.5 m (41 ft), see rules 1 through 5	BNE4x-xx* office transceiver cable
DEBAM-RC/RD	DEBAM-RC/RD	3 km (1.9 mi), see rule 6	Fiber optic cable (refer to Appendix B)
DEBAM-RF/RG	DEBAM-RF/RG	10 km (6.2 miles), see rule 6	Fiber optic cable (refer to Appendix B)
DEBAM-RC/RD	802.3 Repeater	1.5 km (0.93 mi), see rule 6	Fiber optic cable (refer to Appendix B)
AC Outlet	Bridge	1.8 m (6 ft)	Country-specific (refer to Section 1.1.3)

*BNE3x-xx transceiver cable and BNE4x-xx office transceiver cable can be interconnected. However, the cable attenuation (signal loss) for the office transceiver cable is greater than that of BNE3x-xx transceiver cable by a factor of four. For example, 2 meters (6.6 feet) of office transceiver cable is electrically equivalent to 8 meters (26.2 feet) of BNE3x-xx transceiver cable.

Basic configuration rules:

1. If the bridge connects to an IEEE 802.3 transceiver such as the H4005 or to a DESTA, the transceiver cable must be an IEEE 802.3 compliant transceiver cable (BNE3H/K/L/M or BNE4C/D).

2. If the bridge connects to a non-IEEE 802.3 transceiver such as the H4000, the transceiver cable can be either Ethernet or IEEE 802.3 compliant.

3. IEEE 802.3 transceiver cables and Ethernet transceiver cables cannot be interconnected.

4. Maximum length for the transceiver cable cannot exceed 50 meters (164 feet). This maximum length can be reduced due to the *internal cabling equivalency* of a device (such as a DELNI) that is connected between the bridge and the transceiver, or due to the use of office transceiver cable. The cabling equivalency of such a device must be subtracted from the 50-meter (164-feet) maximum.

   Cabling equivalency is a measure of the internal timing delay of a device expressed in meters of transceiver cable.

   For example:

   - If a device has a 5-meter (16.4 feet) cabling equivalency, then its maximum allowable transceiver cable length is 50 meters (164 feet) minus 5 meters (16.4 feet) or 45 meters (148 feet).

   - Office transceiver cable (BNE4x-xx), due to its smaller diameter, has a signal loss that is four times that of the (BNE3x-xx) transceiver cable. Therefore, if office transceiver cable is used, the maximum transceiver cable distance must be divided by 4. This means the maximum office transceiver cable length allowed is 12.5 meters (41 feet).

   If the configuration includes a device and the device has any internal cabling equivalency, this should be subtracted from the 50-meter (164 feet) maximum before dividing by 4. For example, if a device has a 10-meter (328 feet) cabling equivalency and is attached to its transceiver using office transceiver cable, then the maximum allowable transceiver length is 50 meters (164 feet) minus 10 meters (328 feet) divided by 4. The arithmetic result yields 10 meters (328 feet).

   For device-specific information related to cabling equivalency, refer to the *DECconnect System Planning and Configuration Guide.*

5. When connecting the bridge to a configuration that includes a DELNI, allow 5 meters (16.4 feet) cabling equivalency loss for the DELNI.

6. If remote (fiber optic) bridges are used, they can be used in one of two ways:

   - A Bridge-to-Bridge Link—The DEBAM-RF/RG model provides 17 dB of usable optical power at 1300 nanometers. This option can achieve distances of up to 10 kilometers (6.2 miles) when connecting two DEBAM-RF/RG units using 62.5/125 micron fiber. Connection to a remote repeater is not permitted.

     The DEBAM-RC/RD model is also available and provides 14 dB of usable optical power at 850 nanometers. This option can achieve distances of up to 3 kilometers (1.9 miles) when connecting two DEBAM-RC/RD units. Connection to a remote 802.3 repeater is permitted, but remote repeater budget limitations apply.

   - A Bridge-to-Repeater Link—When configured in this manner, the fiber path can be 500 meters (1640 feet) in length plus any available fiber length not used under the 1000-meter (3280-feet) limitation for remote repeaters. This allows a bridge-to-repeater link to reach up to 1500 meters (4920 feet).

   NOTE

   More information about this subject is provided in Section 3.4

7. Remote versions of the LAN Bridge 200 unit (DEBAM-Rx) are not compatible with remote LAN Bridge 100 units (DEBET-Rx) or with the DEREP-Rx remote repeater.

8. Digital recommends you configure your networks so that station-to-station paths contain no more than seven bridges in order to ensure acceptable packet transmit time between stations.

3.4 Cabling for Fiber Optic Models

There are two remote (fiber optic) versions of the LAN Bridge 200 product: DEBAM-RC/RD and DEBAM-RF/RG. The two versions differ in the fiber optic technology that they use and in the maximum attainable distance that the fiber optics can span.

The DEBAM-RC/RD uses 850 nanometers wavelength LED transmitters and supports 50, 62.5, 85 and 100 micron core fiber types. A maximum distance of 3 kilometers (1.9 miles) using 62.5 fiber is possible between two DEBAM-RC/RD models. Ethernet timing requirements restrict distances between a bridge and a repeater to a maximum of 1.5 kilometers (0.93 miles).

The DEBAM-RF/RG uses 1300 nanometers wavelength LED transmitters and was designed for use with 62.5/125 micron Graded Index Multimode Optical Fiber conforming to Digital Equipment Corporation General Specification 1710002-GS. A maximum distance of 10 kilometers (6.2 miles) can be supported on 62.5 micron core fiber. Other optical fiber sizes can be used but can result in lower maximum transmission distances and lower loss budgets.

New installations should be wired with 62.5/125 micron Graded Index Multimode Optical Fiber conforming to Digital Equipment Corporation General Specification 1710002-GS. Other optical fiber sizes can be used but can result in lower maximum transmission distances. Your cable installer should provide proof of compliance.

The following sections provide an overview of the LAN Bridge 200 optical system and some basic guidelines regarding the fiber optic link.

3.5 LAN Bridge 200 Fiber Optic System

The fiber optic system in the LAN Bridge 200 unit comprises a transmitter, optical cable and a receiver. ST-type connectors are used to connect the cable to the transmitter and receiver. Since the LAN Bridge 200 is a duplex link, there are actually two such optical systems in the link to provide bidirectional transmission.

The transmitter converts an electrical data signal into an optical pulse train and transmits the light pulses into the core of the optical fiber in the cable. The cable guides the light to the optical receiver which converts the light pulses once again to an electrical data stream. The cable plant can have a number of connectors and splices in it.

For the receiver to function correctly there must be sufficient optical power. Cables and connectors cause incremental loss of the optical signal. The primary measure of the LAN Bridge 200 optical system is its optical loss; the end-to-end optical loss of the optical channel must therefore be controlled to ensure proper operation of the LAN Bridge 200 unit.

3.5.1 DEBAM-RC/RD Optical System

The DEBAM-RC/RD model is optimally designed to span a distance up to 3 kilometers (1.9 miles) using 62.5 micron core fiber, but other fiber types are also supported. It uses 850 nanometer wavelength LED transmitters and PIN photodiode receivers.

The optical loss budget that is available depends on the fiber type being used: 50 micron core fiber provides a 9 dB optical loss budget; 62.5 micron core fiber provides a 14 dB optical loss budget; 85 micron core fiber provides a 15 dB optical loss budget; and 100 micron core fiber provides a 16 dB optical loss budget.

CAUTION

> If 100 micron fiber is used in very short link lengths (less than 1 kilometer [3280 feet]), the cable will not have sufficient optical loss and will cause the receiver to malfunction. Optical loss must be introduced by attaching the fixed attenuator spacer (shipped with your LAN Bridge 200 unit) to the transmit connector at both ends of the link. The fixed attenuator limits the optical power reaching the receiver and should only be installed when very short link lengths are required (refer to Section 4.6).

The optical loss in the optical channel is contributed by the intrinsic optical loss of the cable itself (measured in dB/km) and by the losses contributed by each of the connectors and splices that are used in the cable plant.

It is important that the optical loss of the cable has been measured at 850 nanometers since the attenuation of optical cables varies with the wavelength. High-quality cables have lower optical loss per kilometer values than low-quality cables. Connector optical losses are generally not wavelength dependent.

An additional power penalty due to chromatic and modal dispersion effects must be considered for long cable lengths (1 kilometer [3280 feet] and greater). The use of 850 nanometer wavelength LEDs in combination with the dispersion properties of optical fibers gives rise to a signal degradation. The effect of this degradation is a higher bit error ratio, but it can be compensated for by increased optical power. A complete optical system power budget will include this dispersion power penalty. A rough estimate is that 2 to 3 dB of the budget should be reserved for this effect when the link length exceeds 2 kilometers (1.3 miles).

The cable repair strategy also affects the optical loss budget. Although damaged cable is repairable, it is usually at the cost of additional losses due to the splices or connectors that must be used to replace the damaged section. A thorough wiring strategy includes loss budget explicitly set aside for future repairs.

3.5.2 DEBAM-RF/RG Optical System

The DEBAM-RF/RG model is designed to span a distance up to 10 kilometers (6.2 miles) using 62.5 micron core fiber. When used with the design fiber, the link provides the user with 17 dB of optical loss to achieve the required transmission distance.

The optical loss in the optical channel is contributed by the intrinsic optical loss of the cable itself (measured in dB/km) and by the losses contributed by each of the connectors and splices that are used in the cable plant.

It is important that the optical loss of the cable is measured at 1300 nanometers since the attenuation of optical cables varies with wavelength. High-quality cables have lower optical loss per kilometer values than low-quality cables. Connector losses are generally not wavelength dependent.

When the DEBAM-RF/RG is required to span long distances (i.e., 5-to-10 kilometers [3.1-to-6.2 miles]) or when extensions to an existing link are being planned, careful attention must be paid to the total optical loss of the cable plant. High-quality cables, connectors and splices are strongly recommended. The optical loss of high-quality cables depends on the cable type, but can range from 0.5 dB/km to 1.0 dB/km; splice losses can vary from 0.2 to 0.5 dB each, and connector losses can range from 0.3 to 1.0 dB each.

Any cable plant, long or short, should be similar with respect to fiber type. Mixing fiber types usually results in very high losses and is not recommended.

The cable repair strategy also affects the optical loss budget. Although damaged cable is repairable, it is usually at the cost of additional losses due to the splices or connectors that must be used to replace the damaged section. A thorough wiring strategy includes loss budget explicitly set aside for future repairs.

During initial installation, the optical loss of the optical channel can be quickly checked at the receive end of the fiber by measuring the optical power exiting the fiber. The transmitting station must be powered up and transmitting an optical idle signal. If the power exiting the fiber at the receive end is between -35 dBm and -23 dBm (measured at 1300 nanometers wavelength), the optical loss is within the allowed limit and the optical system should be functional.

The system has margin built into it to allow for gradual transmitter and receiver degradation over the life of the product. However, the margin can result in too much power for very short transmission lengths. If the DEBAM-RF/RG unit is connected to a very short link, the attenuator spacers (shipped with the product) should be attached to both the receive and transmit connectors at both ends of the link. Optical power exiting the fiber in excess of -23 dBm is an indication

that the cable plant does not have sufficient optical loss. The receiver will not function properly unless optical loss is introduced with the fixed attenuator that is sufficient to limit the optical power to -23 dBm or less. This attenuation is only required in link lengths that have less than 10 dBm optical loss (refer to Section 4.6).

Losses due to chromatic and modal dispersion have been accounted for in the design of the DEBAM-RF/RG; no explicit loss budget needs to be set aside for dispersion.

3.6 Digital Equipment Corporation Fiber Optic Cables

Digital sells two fiber optic cables for indoor wiring use: the BN25J-*xx* general purpose and the BN25K-*xx* plenum cable.

These are dual-fiber cables with 62.5/125 micron fiber specified at both 850 nanometers and 1300 nanometers, in accordance with Digital's PS 171002-0-0 General Specification for 62.5/125 micron optical fiber. Both cables are terminated with 2.5 millimeter (.10 inch) ST-type connectors and are available in a variety of lengths.

3.7 Reconfiguring and Installing Additional Cables

If you are reconfiguring or installing additional cables, refer to the *DECconnect System Planning and Configuration Guide* before you begin. This guide contains information you need to plan and configure your network. Also, the *DECconnect System Facilities Cabling Installation Guide* provides information on planning and installing fiber optic cable runs.

If you need more detailed information regarding fiber optic cables, you can order the *LAN Bridge 200 Problem Solving* manual. This manual has a section dedicated to fiber optic link analysis, which can be useful if you are designing, repairing, or troubleshooting the fiber optic portion of your network.

3.8 Preinstallation Checks

Before beginning the bridge installation, use the following checklists to ensure that site preparation is complete:

Hardware

- ☐ The appropriate baseband or broadband network interface is installed; and the required transceiver cabling is in place, tested, and tagged (if a Chipcom Ethermodem is used, AUI ECHO MODE must be disabled). If the device is not installed, ensure that arrangements for the installation are made before the bridge installation begins.
- ☐ If you are installing a remote bridge, be sure the fiber optic cables are installed in place, tested, and tagged.
- ☐ Arrangements were made to connect the bridge's transceiver cable to the appropriate baseband or broadband network interface.
- ☐ The wall/partition mounting bracket kit is installed (if required) as described in the kit documentation.
- ☐ The transceiver cables are available in the appropriate lengths.

Suitable Environment

The items listed in this checklist must conform to the specifications described in Appendix B of this guide.

- ☐ The power outlet matches the power requirements of the bridge you ordered and is within 1.8 meters (6 feet) of the installation site.
- ☐ The temperature, altitude, and humidity ranges are correct.
- ☐ The space is adequate for ventilation and for maintenance access.
- ☐ The location is at least 45 centimeters (18 inches) above the floor surface.

Service

- ☐ The (optional) service contracts are in place. Call your Digital sales representative for information on hardware and software services that are available to support your LAN Bridge 200 unit.

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4

LAN Bridge 200 Installation

4.1 Introduction

This chapter explains how to install, power up, and verify the operation of the LAN Bridge 200 unit. Before you begin these procedures, read and follow the instructions in Chapter 3.

WARNING

To avoid bodily injury or damage to the equipment, DO NOT connect the bridge's power cord until instructed to in the following procedures.

4.2 Verifying Switch Settings

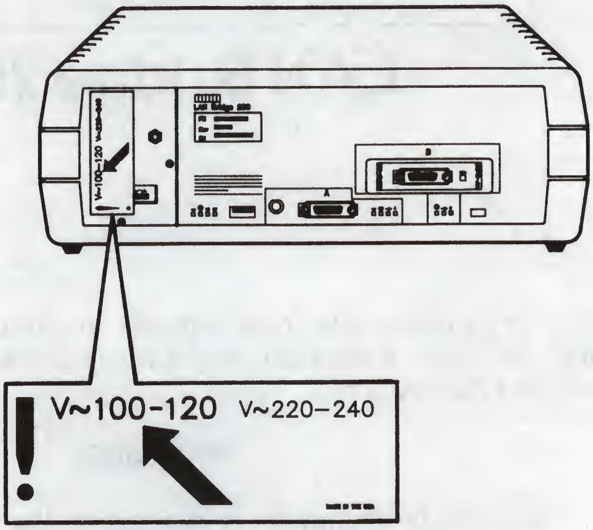
The LAN Bridge 200 unit is shipped from the factory with all switches preset for basic bridge operations. The following sections provide information for verifying and resetting the switches (if necessary).

Appendix A provides a full description of all switch functions and also describes the controls, status LEDs, and connectors used on the LAN Bridge 200 unit.

4.2.1 Verifying the Voltage Select Switch Setting

1. Locate the removable voltage label on the bridge's I/O panel.

   Note the operating range indicated by the arrow on the label. This is the factory-set operating range of the bridge.



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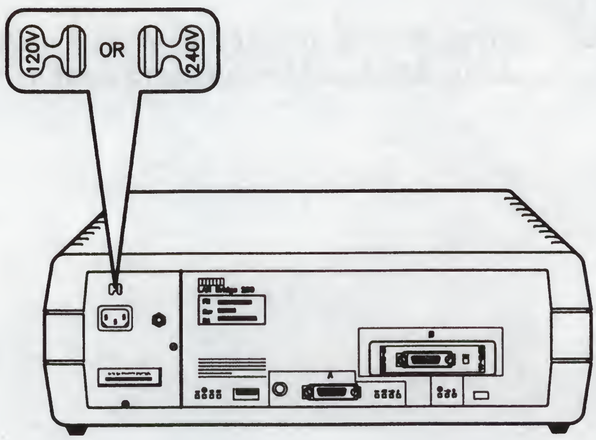
2. Peel the voltage label from the bridge exposing the voltage select switch.

   Verify that the voltage select switch is set to the operating range indicated by the label, and that this is the correct setting for your power source. (See your electrician if you are not sure.)



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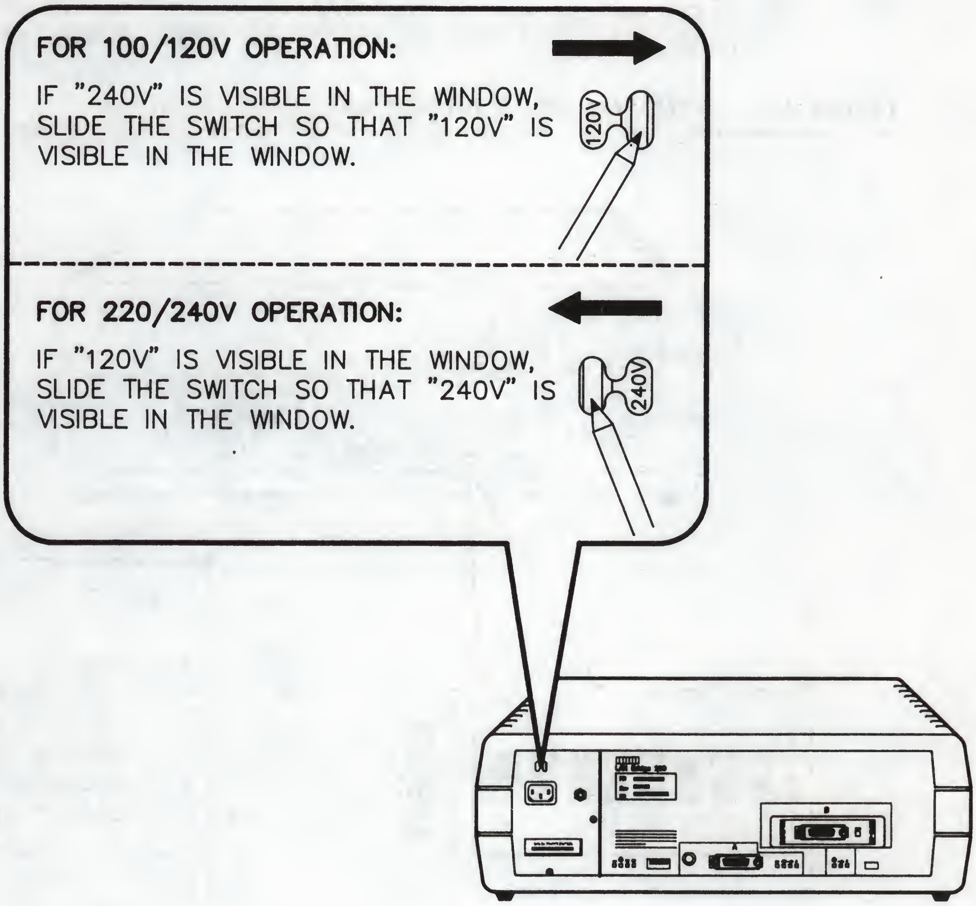
3. If the voltage setting is not correct for your power source, set the voltage select switch to match the power source voltage.

CAUTION

An incorrect voltage setting can damage the bridge.



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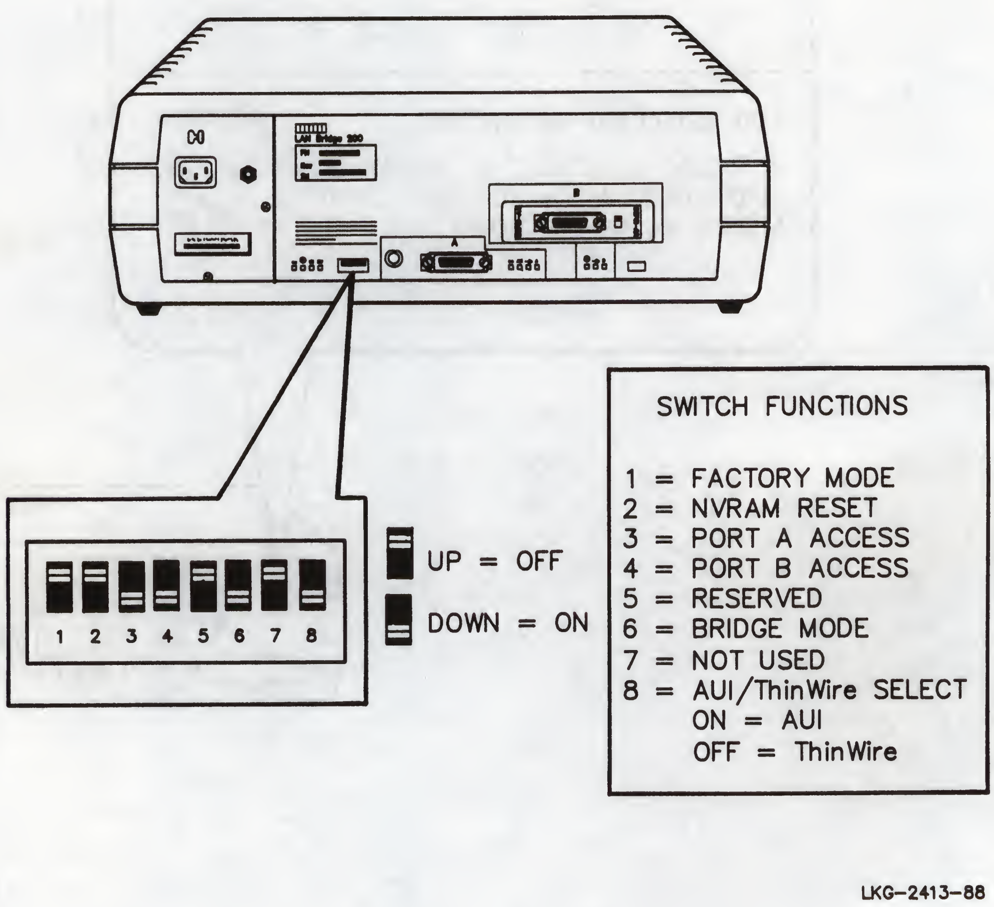
4.2.2 Verifying the Configuration Switch Setting

The switch positions shown in Figure 4–1 are factory set for the initial installation of the bridge. Check to see that the switches on the bridge you are installing match those shown here during this initial installation.

NOTE

If you are connecting the bridge to a ThinWire Ethernet cable, set switch 8 to the OFF (up = OFF) position now.

Figure 4–1: Verifying the Configuration Switch Settings



4.2.3 Verifying the DEBAM-RC/RD Optical Idle Switch Settings

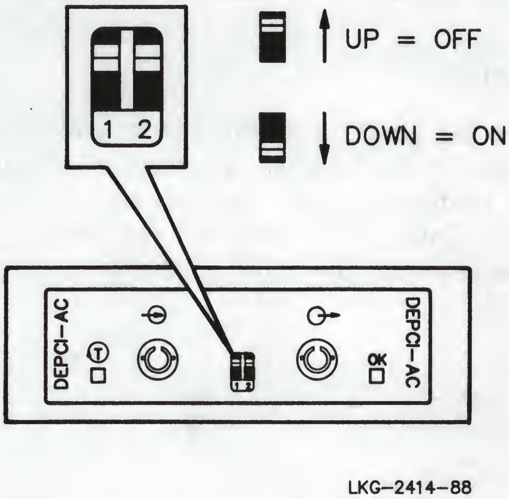
If you are installing a DEBAM-RC/RD model, check to see that the optical idle switches are set as shown in Figure 4–2.

NOTE

The switches on the DEBAM-RC/RD unit (or Digital device) at the other end of the link must also be set as shown in Figure 4–2.

If you are connecting the DEBAM-RC/RD unit to a non-Digital 802.3 compliant device, set switch 1 OFF (up = OFF) and set switch 2 ON (down = ON).

Figure 4–2: Verifying the Optical Idle Switch Settings (For DEBAM-RC/RD Units Only)



4.3 Placement of the LAN Bridge 200

The LAN Bridge 200 unit is housed in a plastic enclosure that allows for placement on a table or desk. The plastic enclosure can be easily removed for mounting the unit in a standard 48-centimeter (19-inch) RETMA rack cabinet (a rack mount kit is provided). An optional kit (Order Code H039) is available for mounting the bridge on a wall or partition without removing the plastic enclosure. Installation instructions are provided with the installation kit.

CAUTION

Whichever installation you choose, allow a minimum of 10 centimeters (4 inches) clearance around the bridge's air inlets and outlets to ensure optimal air flow.

NOTE

Always place the bridge so that the I/O panel is visible. This allows you to monitor the bridge status LEDs.

4.3.1 Table Top Installation

Do not remove the plastic enclosure when installing the bridge in an office environment. Allow 10 centimeters (4 inches) of airspace around the bridge air vents and place the bridge on a table or desk that is at least 45 centimeters (18 inches) above the floor. This allows adequate ventilation for cooling fans and reduces exposure to excess dust from foot traffic.

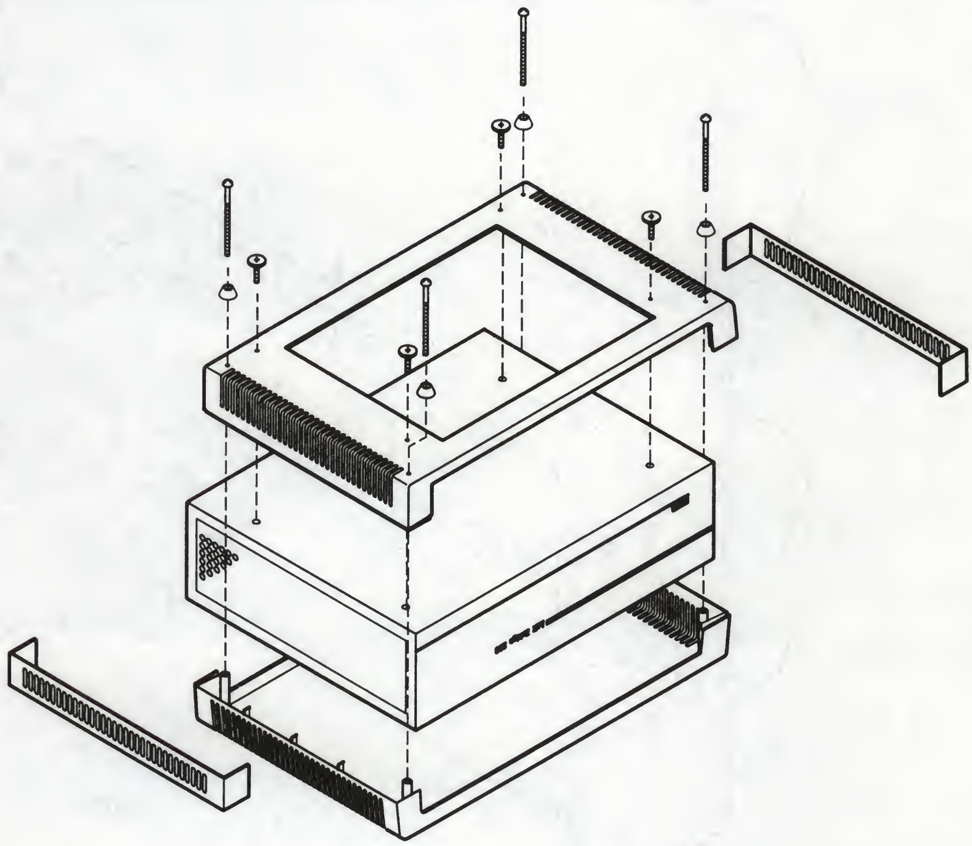
4.3.2 Rack Mount Installation

The bridge can be mounted in a standard 48-centimeter (19-inch) RETMA rack cabinet using the rack mount kit provided with your LAN Bridge 200 shipment.

Rack mounting the bridge requires removal of the bridge's plastic enclosure, attaching the u-nuts to the cabinet rails, and installing the rack mount brackets to the bridge. To rack mount the LAN Bridge 200 unit, proceed as follows:

Remove Plastic Enclosure:

1. Place the bridge upside down on a sturdy surface or floor.
2. Remove the eight screws from the bottom of the unit, then remove the plastic enclosure. (Store the unused plastic enclosure and associated hardware for possible future use or reconfiguration.)



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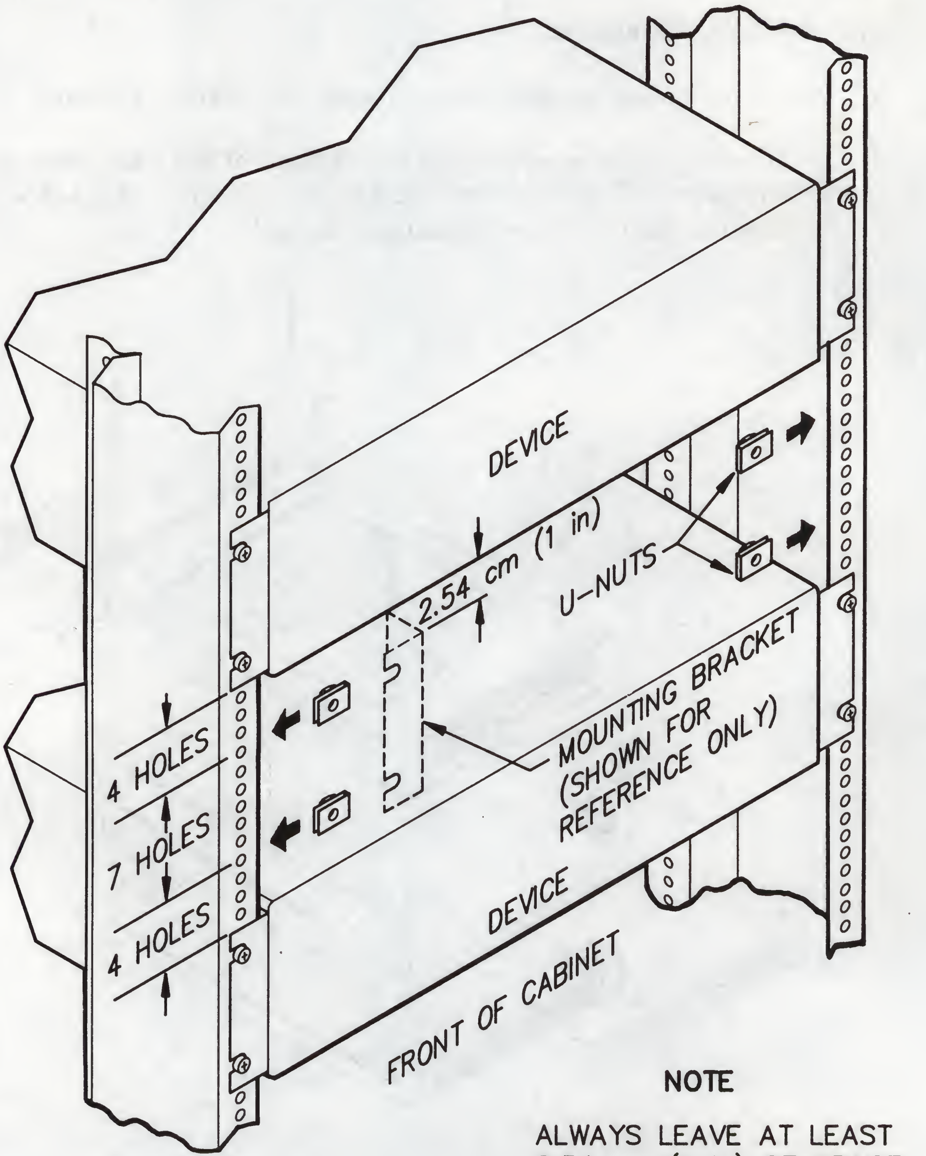
CAUTION

Do not reinstall enclosure screws to the bridge's metal chassis. Doing so could damage the bridge.

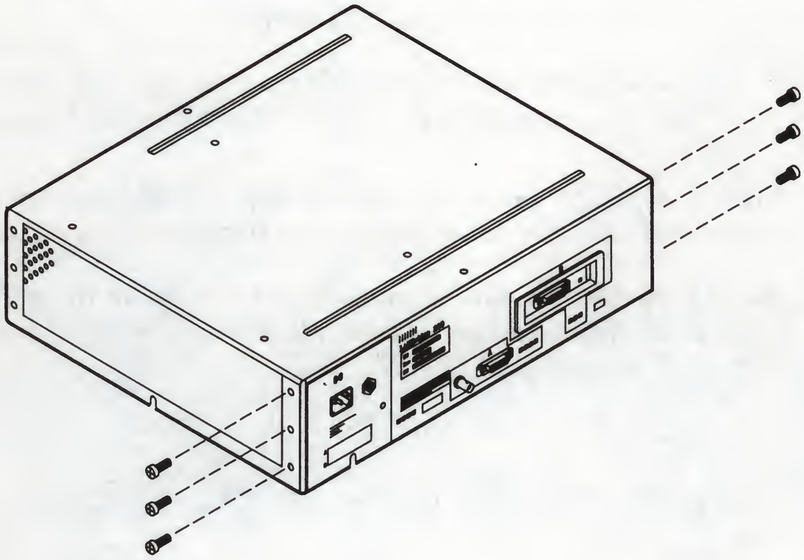
Attach U-Nuts to Cabinet Rails:

1. Locate and remove the rack mount kit from the shipping box (see Figure 2–2).
2. Determine where you will mount the bridge in the cabinet. Allow 2.54 centimeters (1 inch) spacing between mounted devices and attach the 4 u-nuts to both rails at the front of the cabinet as shown in the illustration.



Install Rack Mount Brackets:

1. Remove the 4 screws (or 6 screws if installed) from the sides of the chassis adjacent to the bridge's I/O panel. Save the screws for future use.



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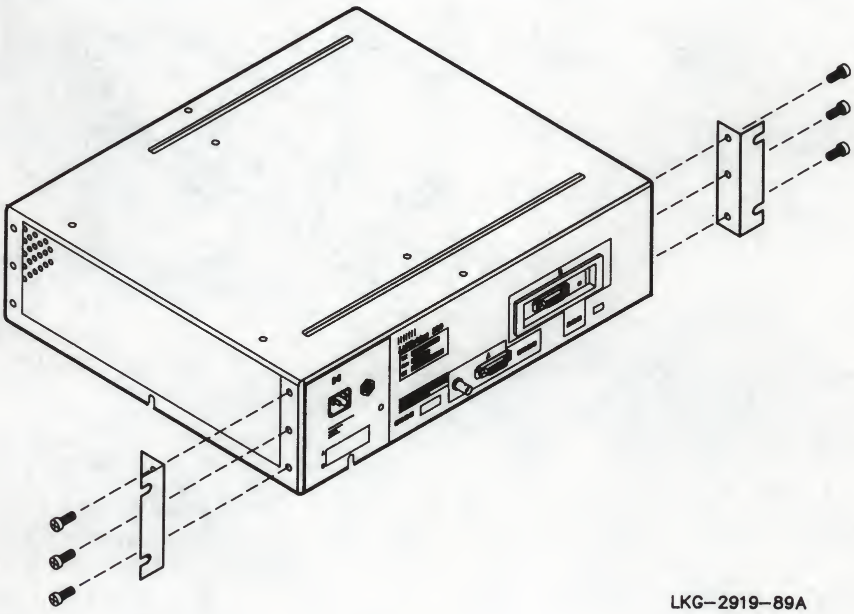
2. Install the rack mount brackets, as shown in the illustration, using 6 (8-32) Phillips-head screws with lock washers (provided in the rack mount kit).



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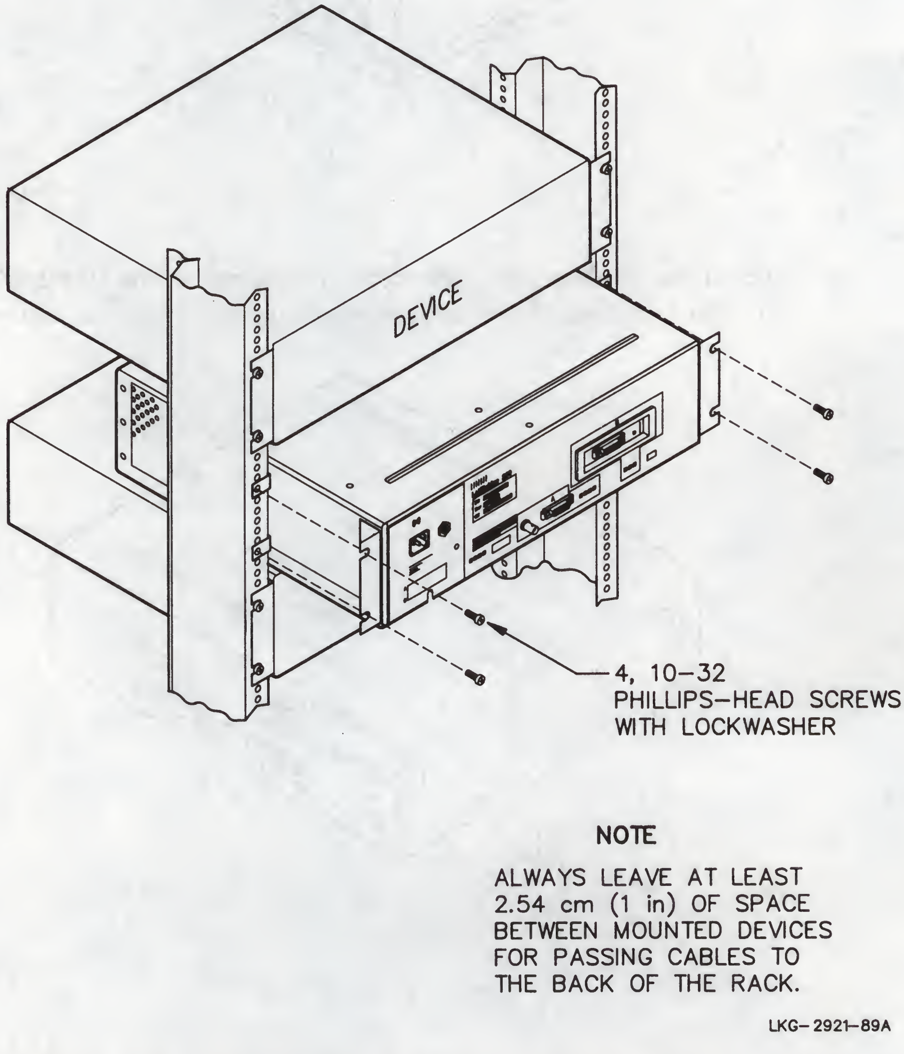
Install Bridge To Cabinet:

Note that the bridge must be mounted in the front of the cabinet so that the bridge's I/O panel is visible. This allows monitoring of the bridge status LEDs.

WARNING

> To avoid bodily injury or damage to the equipment, two people are required to mount the bridge into the cabinet.

1. With one person supporting the bridge from the back of the cabinet, slide the bridge into the designated space from the front of the cabinet.
2. Secure the rack mount brackets to the u-nuts on the cabinet rails using 4 (10-32) Phillips-head screws with lock washers (provided in the rack mount kit).



3. Continue with the LAN Bridge 200 hardware installation.

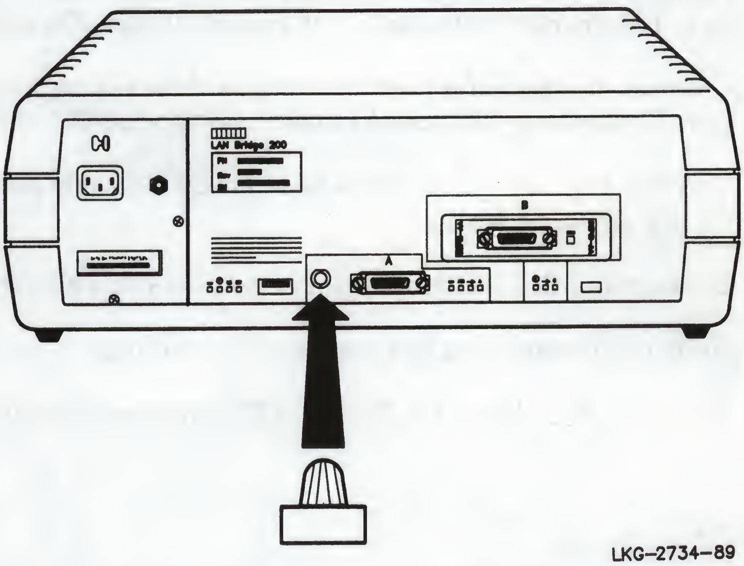
4.4 Connecting the ThinWire Ethernet Cable

This procedure shows how to connect Port A of the LAN Bridge 200 unit to a ThinWire Ethernet cable segment.

You can add the bridge to a ThinWire segment anytime. However, because network traffic is disrupted when you add a station (the bridge is an addressable device and considered a station), it is advisable to add stations during nonworking hours to minimize the number of people affected by the network disruption. To install the ThinWire cable, proceed as follows:

Attach T-Connector to Bridge:

1. Set configuration switch 8 to the OFF (up = OFF) position (see Figure 4–1).
2. Locate the T-connector and the two terminators in the shipping box.
3. Remove (if attached) both terminators from the T-connector. Save the terminators for future use.
4. Connect the T-connector to the ThinWire connector at Port A of the bridge.



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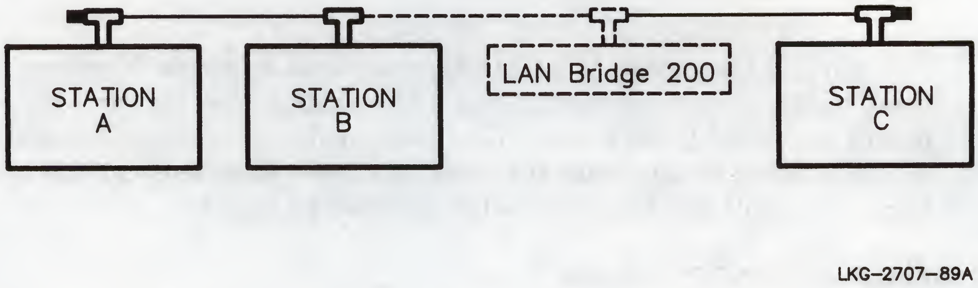
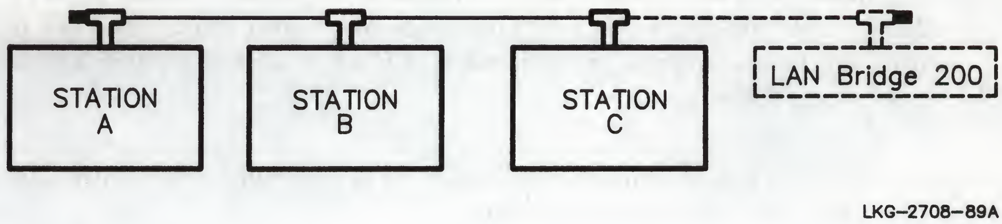
5. If you are adding the bridge to the *middle* of a ThinWire segment, go to *Connecting to the Middle of a ThinWire Segment*.
6. If you are adding the bridge to the *end* of a ThinWire segment, go to *Connecting to the End of a ThinWire Segment*.

Connecting to the Middle of a ThinWire Segment:



1. Inform all network users that the segment is going to be shut down.
2. Shut down any file server or print server on the segment.
3. Remove the ThinWire cable from the T-connector attached to one adjacent station.
4. Connect the end of the ThinWire cable you just removed to one end of the new T-connector (attached to the LAN Bridge 200 unit).
5. Connect one end of a new ThinWire cable section to the other end of the new T-connector (attached to the LAN Bridge 200 unit).
6. Connect the other end of the new ThinWire cable section to the T-connector on the adjacent station.
7. Restart any file server or print server on the ThinWire cable segment.
8. Inform all users that the segment is available.
9. Continue with the LAN Bridge 200 hardware installation.

Connecting to the End of a ThinWire Segment:

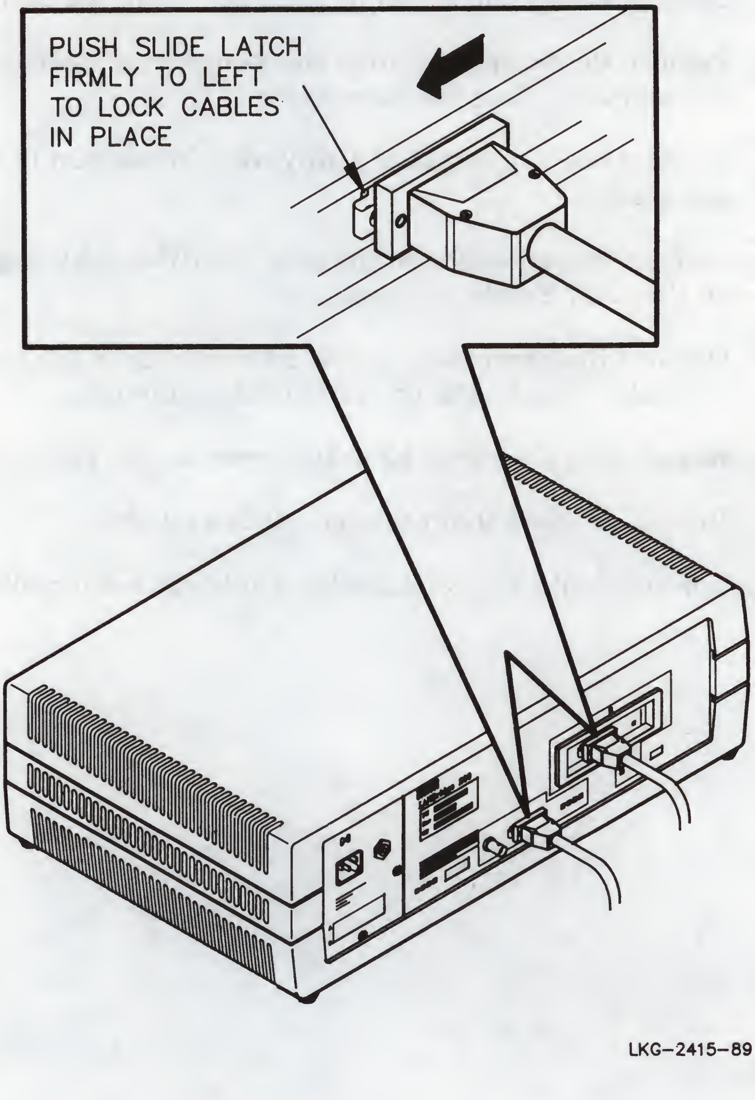


1. Inform all network users that the segment is going to be shut down.
2. Shut down any file server or print server on the segment.
3. Remove the terminator from the T-connector attached to the last station on the segment. Save the terminator.
4. Connect one end of a new ThinWire cable section to the T-connector on the last station.
5. Connect the other end of the new ThinWire cable segment to the T-connector on the LAN Bridge 200 unit.
6. Connect the previously removed terminator to the other end of the new T-connector attached to the LAN Bridge 200 unit.
7. Restart any file server or print server on the ThinWire cable segment.
8. Inform all users that the segment is available.
9. Continue with the LAN Bridge 200 hardware installation.

4.5 Connecting the Transceiver Cables

This procedure shows how to connect transceiver cables to both Ports A and B of a local LAN Bridge 200 unit. Note that if you are installing a remote LAN Bridge 200 (DEBAM-R*x*) unit that uses fiber optic cables at Port B, there will be only one transceiver cable to install at Port A. To install the transceiver cable(s), proceed as follows:

1. Push the port connector slide latch to the right, then plug the transceiver cable into the port connector.
2. Push the port connector slide latch to the left until it snaps into the locking position.
3. Gently pull on each plug to make sure that the latch is secure.



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4.6 Connecting the Fiber Optic Cables

For proper operation of the remote link, you may need to install one or two (depending on model type) attenuator spacer/s on the transmit and/or receive ends of the fiber optic cable before you connect them to the bridge. To determine if you need to install the attenuator spacer/s, do the following:

1. Note the labeling on the fiber optic cable designated for the unit you are about to install:

   The cable installer should have tagged the cable according to fiber type (for example, 50/125, 62.5/125, 85.0/125, or 100/140 micron fiber) and the attenuation of each cable should also have been characterized and recorded. The characterized attenuation value (measured in dB units) determines if the attenuator spacer/s are necessary for the installation.

2. Refer to Table 4–1. If the cable has an attenuation value that is LESS than the value in the table, the attenuator spacer/s must be installed. (Table values are based on nominal system characteristics.)

Table 4–1: Fiber Optic Attenuation Values

Model	50/125	62.5/125	85.0/125	100/140
DEBAM-RC/RD [1]	N/A [3]	N/A [3]	N/A [3]	4dB
DEBAM-RF/RG [2]	3dB	7dB	9dB	9dB

[1]If required for the DEBAM-RC/RD model, install one attenuation spacer on the transmit connection at both ends of the link.
[2]If required for the DEBAM-RF/RG model, install two attenuation spacers: one on the transmit connection, and one on the receive connection at both ends of the link.
[3]N/A = Attenuator not required.

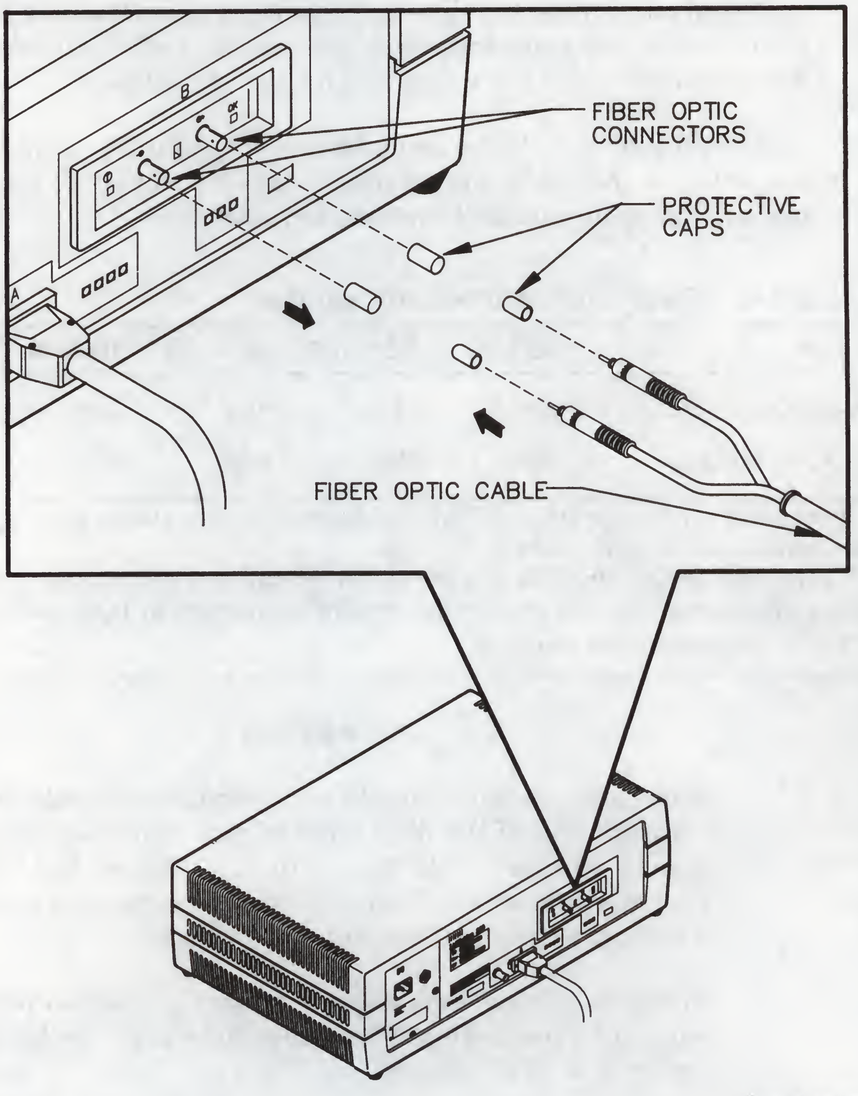
CAUTION

Your cable installer should verify that the ferrule on the transmit end of the fiber optic cable's connector measures 7.87 mm ± .025 mm (.310 in ± .001 in) in length. Ferrules that are shorter can cause less power to be transmitted to the fiber (see Appendix B).

Bridge-to-bridge links require version-to-version pairs only. Interconnecting different remote LAN Bridge 200 versions is NOT allowed.

The following procedure shows how to connect the fiber optic cables to the bridge.

1. Pull the protective caps from the fiber optic connectors and cable plugs (see illustration).
2. Note the labeling on the cable connections (the cable installer should have labeled the transmit and receive ends of the cable while installing the cable runs).
3. If required (refer to Table 4–1), install the attenuation spacer/s onto the ends of the fiber optic cable.

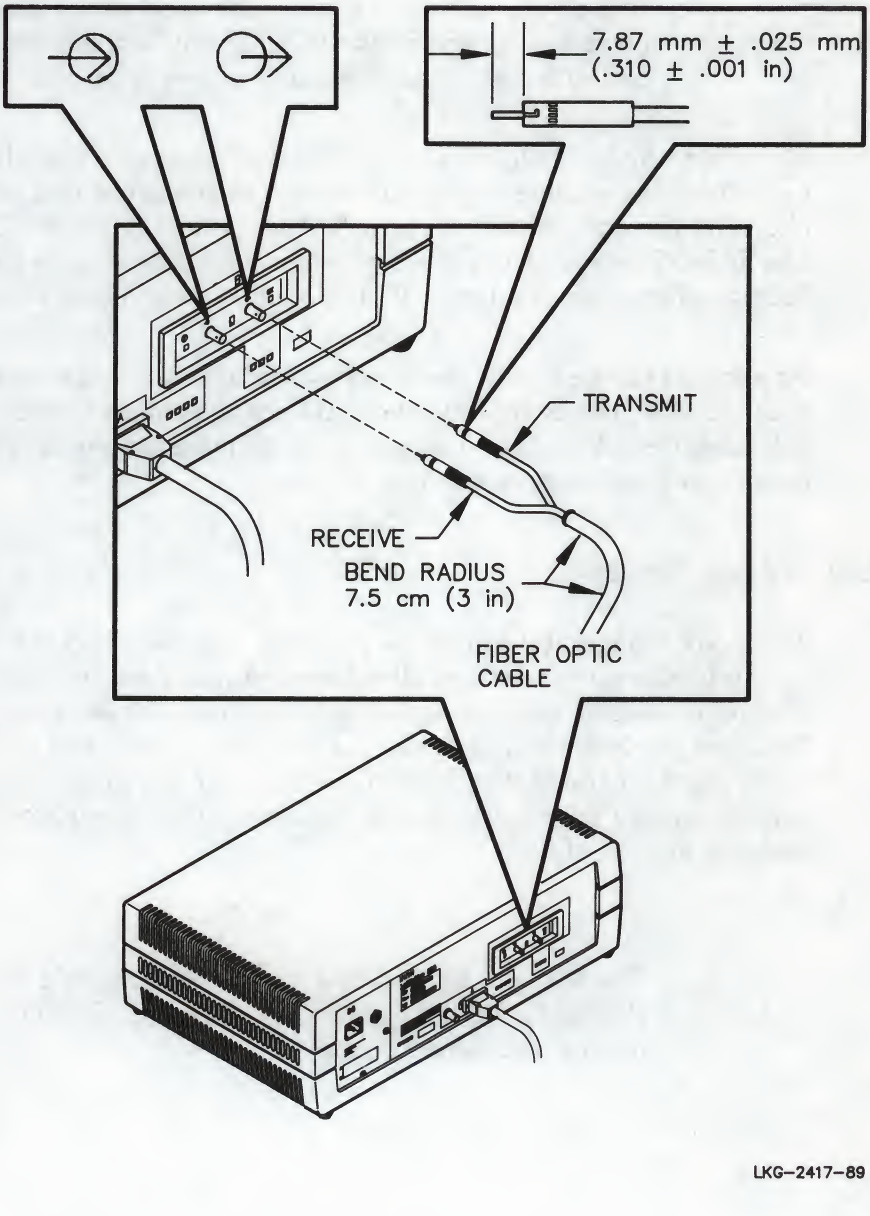


4. Connect the transmit cable to the transmit connector (marked ⊖>) at Port B of the bridge.

5. Connect the receive cable to the receive connector (marked ⊖) at Port B of the bridge.

CAUTION

The fiber optic cable will be damaged by sharp bends. Ensure the cable bend radius is not LESS than 7.5 centimeters (3 inches).



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4.7 Before Connecting Power

Make sure the transceiver cable connections are secure at both ends of the cable. If the cables are not connected when you plug in the power cord, the LAN Bridge 200 unit fails the diagnostic self-test.

If you are installing a remote bridge, be sure that the fiber optic cables are securely connected to the remote device at the other end of the link. If the cables are not connected when you plug in the power cord, the Link OK LED will not illuminate (indicating a link failure).

NOTE

> If the remote device at the other end of the link is not powered up, the Link OK LED will not illuminate (indicating a link failure) when you power up the bridge.

At power up the bridge's remote circuitry transmits signals and receives feedback from the remote bridge (or device) at the other end of the link. This is for checking the link state between the two remote devices. If the other remote device is NOT powered up, the bridge senses a link failure (no signal received) and fails to illuminate the Link OK LED (indicating a link failure).

As soon as the device at the other end of the link is powered up (and transmitting signals), the bridge receives and acknowledges the feedback and illuminates the Link OK LED. Both bridges must be powered up in order to establish and confirm a link between the two devices.

4.8 Connecting Power

The LAN Bridge 200 unit does not have a power ON/OFF switch. Plugging in the bridge power cord applies power directly to the bridge and initiates the bridge diagnostic self-test which last for about 30 seconds. The self-test verifies that the basic bridge functions are operational and provides a brief 2-second lamp check of the status LEDs (see note). If the diagnostic self-test is successful, the bridge then initiates the Spanning Tree Algorithm which takes about 30 seconds for completion.

NOTE

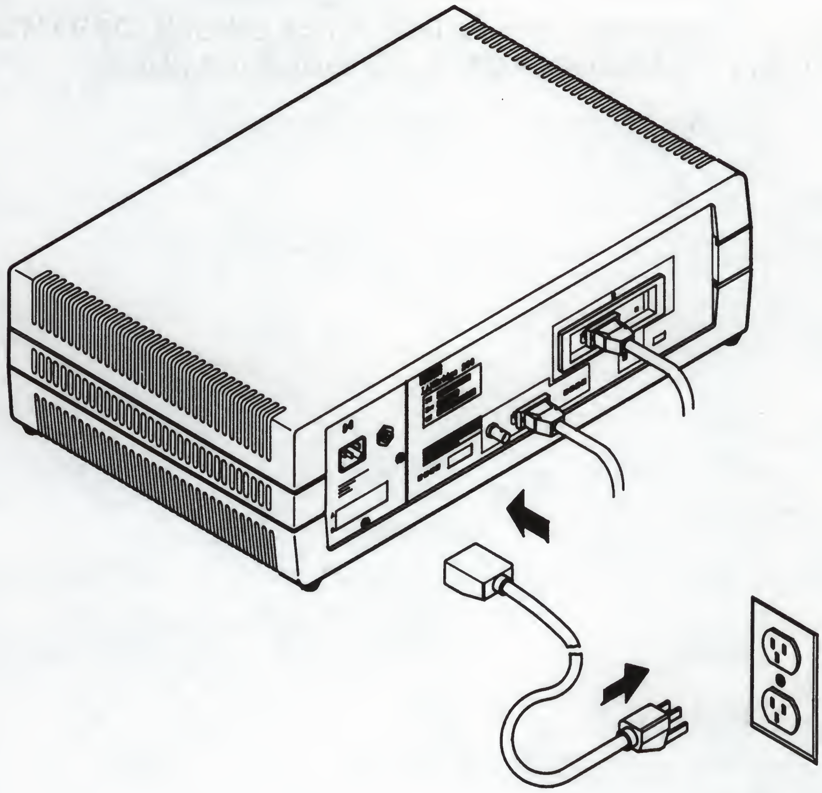
> The status LEDs on the remote version PCI devices (DEBAM-RC/RD and DEBAM-RF/RG) do NOT illuminate during the lamp check.

To connect the bridge power cord proceed as follows.

WARNING

> To avoid bodily injury or equipment damage, use care when connecting the bridge power cord.

1. Plug one end of the power cord into the LAN Bridge 200 power receptacle.
2. Plug the other end of the power cord into the wall outlet or into the appropriate power source receptacle.
3. Observe the brief illumination of the Status LEDs to ensure they are operational.



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4.9 Verifying the Installation

Proper installation of the LAN Bridge 200 unit is verified by the condition of the status LEDs on the I/O panel. The conditions of the LEDs can vary depending whether the bridge is a remote bridge or a local bridge.

NOTE

If you are installing a remote LAN Bridge 200 unit (DEBAM-Rx), both ends of the link must be powered up before verifying the installation.

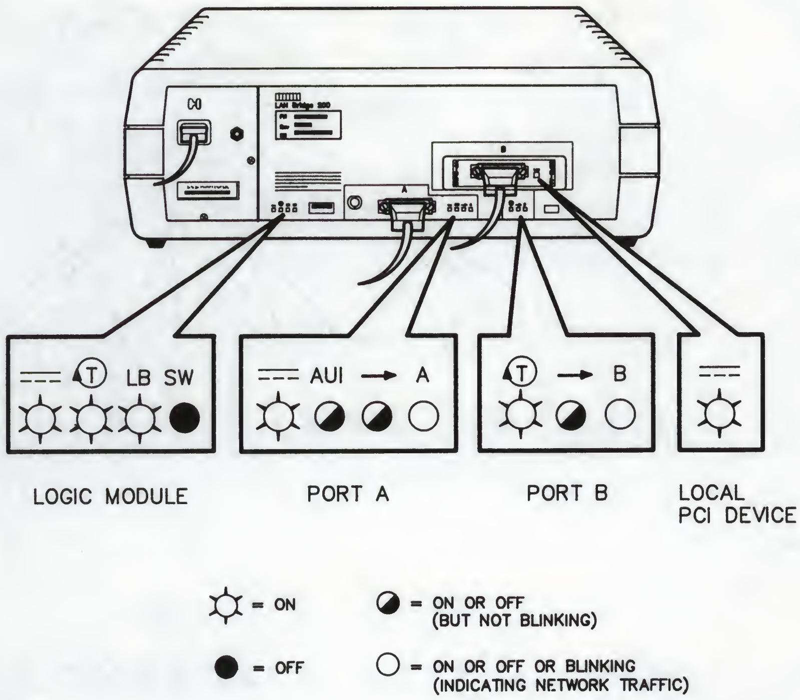
If you are installing a local LAN Bridge 200 unit (DEBAM-AA/AB), go to Section 4.9.1 to verify correct installation.

If you are installing a remote LAN Bridge 200 unit (DEBAM-RC/RD or DEBAM-RF/RG), go to Section 4.9.2 to verify correct installation.

4.9.1 Verifying the Local Bridge Installation (DEBAM-AA/AB)

After powering up the bridge, allow up to 60 seconds for the bridge's self-test and communications tasks to complete, then compare the state of the status LEDs on the bridge with those shown in Figure 4–3:

Figure 4–3: Local Bridge Hardware Verification



IF:	THEN:
THE STATUS LEDS MATCH THOSE SHOWN HERE.	THE LAN Bridge 200 UNIT IS OPERATIONAL. GO TO SECTION 4.10.
THE STATUS LEDS **DO NOT** MATCH THOSE SHOWN HERE.	GO TO CHAPTER 5.

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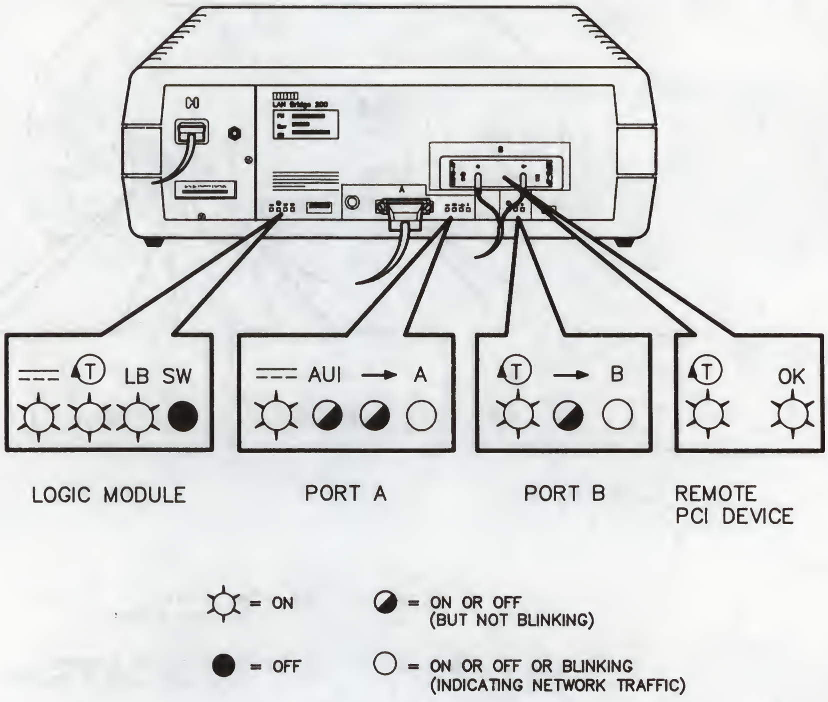
NOTE

For definitions of the status LEDs on the bridge refer to Appendix A.

4.9.2 Verifying the Remote Bridge Installation (DEBAM-RC/RD and DEBAM-RF/RG)

After powering up the bridge, allow up to 60 seconds for the bridge's self-test and communications tasks to complete, then compare the state of the status LEDs on the bridge with those shown in Figure 4–4:

Figure 4–4: Remote Bridge Hardware Verification



IF:	THEN:
THE STATUS LEDS MATCH THOSE SHOWN HERE.	THE LAN Bridge 200 UNIT IS OPERATIONAL. GO TO SECTION 4.10.
THE STATUS LEDS **DO NOT** MATCH THOSE SHOWN HERE.	GO TO CHAPTER 5.

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NOTE

For definitions of the status LEDs on the bridge refer to Appendix A.

4.10 Network Verification

Check with your network manager that the bridge is operational in the network configuration.

Hardware installation is now complete.

5

What to Do If You Have Problems

5.1 Introduction

This chapter provides simple troubleshooting steps to correct problems found during the initial installation verification procedures. If problems continue after you have completed these steps, notify the system/network manager. Additional information about troubleshooting the LAN Bridge 200 unit is available in the *LAN Bridge 200 Problem Solving* manual.

The bridge's status LEDs indicate the operating status of the bridge and are used to determine whether or not the bridge has a problem. This chapter provides several tables and illustrations that describe the various states of the LEDs and their locations according to the model you are troubleshooting. Use these as a reference as you proceed with the troubleshooting steps in this chapter.

For a full description of the controls, status LEDs, and connectors used with your LAN Bridge 200 unit, refer to Appendix A.

NOTE

After diagnosing and correcting the problem, return to Section 4.9 of this manual to verify the correct operation of the LAN Bridge 200 unit.

5.1.1 Local Bridge Status LEDs

The local LAN Bridge 200 unit (DEBAM-AA/AB) has 12 Status LEDs; 11 of the LEDs are located on the I/O panel, and the remaining LED is on the PCI device at Port B (see Figure 5–1). The local bridge PCI device status LED states are described in Table 5–1. The remaining status LEDs states are described in Table 5–3.

Figure 5–1: Local Bridge Status LEDs

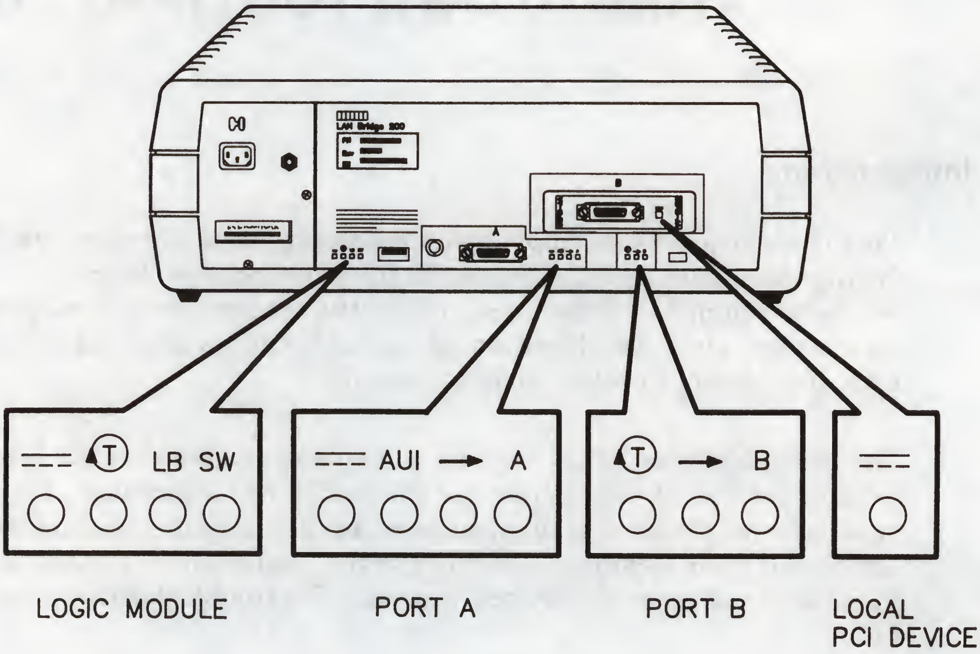


Table 5–1: Local PCI Device Status LED

Symbol	LED Name	ON Steady	OFF	Blinking
═══	DC OK (Port B External)	Port B AUI transceiver power OK	Port B transceiver power failure	N/A

5.1.2 Remote Bridge Status LEDs

The remote LAN Bridge 200 unit (DEBAM-Rx) has 13 Status LEDs; 11 of the LEDs are located on the I/O panel, and the 2 remaining LEDs are on the PCI device at Port B (see Figure 5–2). The remote bridge PCI device status LEDs states are described in Table 5–2. The remaining status LEDs states are described in Table 5–3.

Figure 5–2: Remote Bridge Status LEDs

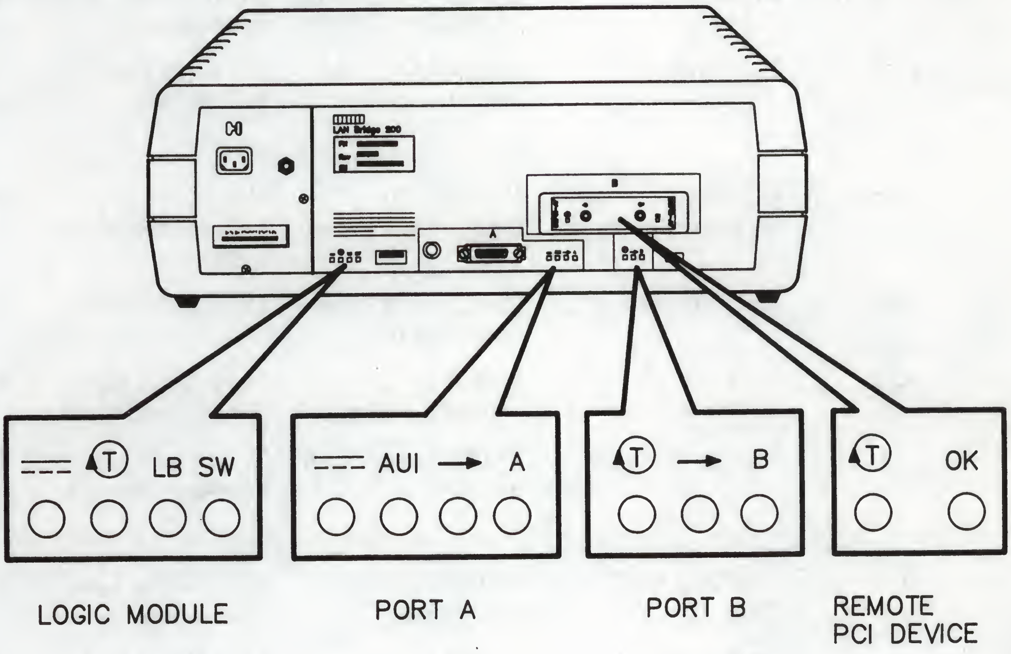


Table 5–2: Remote PCI Device Status LEDs

Symbol	LED Name	ON Steady	OFF	Blinking
(T)	Self-Test OK (PCI Device)	PCI device self-test passed	PCI device self-test failed	N/A
OK	Link OK	Fiber optic link OK	Fiber optic link failed	N/A

Table 5–3: I/O Panel Status LEDs

Symbol	LED Name	ON Steady	OFF	Blinking
⎓	DC OK (Logic Module)	Logic Module DC power valid	Logic Module DC power failure	N/A
Ⓣ	Self-Test OK (Logic Module)	Logic Module self-test passed	Logic Module self-test failed	NVRAM failed (may require replacement)
LB	Bridge	Bridge code operational	Bridge code non-operational	N/A
→ SW	Software	Non-bridge code operational	No valid non-bridge code	Down-line load in progress
⎓	DC OK (Port A External)	Port A AUI transceiver power OK	Port A AUI transceiver power failure	N/A
AUI	AUI/TW Select	Port A AUI interface selected	Port A ThinWire interface selected	N/A
→	On-Line (FWD A)	Port A in forwarding state	Port A not in forwarding state	Fault Indication
A	Port A Activity	Traffic present on network	Traffic not present on network	Traffic present on network
Ⓣ	Self-Test OK (Port B)	PCI device self-test passed	PCI device self-test failed	N/A
→	On-Line (FWD B)	Port B in forwarding state	Port B not in forwarding state	Fault Indication
B	Port B Activity	Traffic present on network	Traffic not present on network	Traffic present on network

5.2 Diagnosing Problems

The troubleshooting procedures in Table 5–4 are symptom-oriented. The symptoms are presented in the order that might occur during the diagnostic self-test that executes at power up.

Table 5–4: Simple Troubleshooting

Symptom	Suggested Corrective Action
All LEDs OFF.	Do the following: ■ Ensure that the bridge's voltage select switch is set to the correct voltage range for your power source. Section 4.2 in this guide provides information for changing the voltage select switch setting, if necessary. ■ Secure the power cable at the bridge and at the wall outlet. ■ Verify that the correct power is available at the wall outlet. If no power is available, check the wall outlet's circuit breaker. If necessary, plug the bridge's power cord into another outlet. ■ Determine if the bridge's circuit breaker has tripped. If it has, press in on the white center button to reset the breaker. If the circuit breaker continues to trip, notify the system/network manager that the bridge must be returned to Digital for repair or replacement. ■ Use a meter to measure the continuity of the power cable. If it is defective, replace the cable. If the fault persists, more extensive troubleshooting is required. Notify the system/network manager.
DC OK (Logic Module) is OFF, any other LED ON.	Notify the system/network manager that the bridge must be returned to Digital for repair or replacement.

Table 5–4 (Cont.): Simple Troubleshooting

Symptom	Suggested Corrective Action
The Self-Test OK LED (Logic Module) remains OFF.	The LAN Bridge 200 Logic Module is defective. Notify the system/network manager that the bridge must be returned to Digital for repair or replacement.
The Self-Test OK LED (Logic Module) is blinking.	The unit's non-volatile RAM (NVRAM), used to store station address and parameters set by bridge management software, has failed. You may be able to bypass the fault and use the bridge default parameters. Set the NVRAM Reset switch (switch 2) to the down (down = ON) position, and then cycle the bridge power OFF, and then ON. After the lamp test is verified, set the NVRAM Reset switch 2 to the OFF position (up = OFF). Notify the system/network manager of the problem. Digital Field Service must be called to correct the problem even if you are able to bypass the fault and use the default parameters.
The Self-Test OK LED (Port B) remains OFF.	Perform the loopback test as described in Section 5.3.
The Self-Test OK (PCI Device) LED on the remote PCI device at Port B remains OFF.	PCI device at Port B is faulty. Notify the system/network manager that the bridge must be returned to Digital for repair or replacement.
ON-Line (FWD A) or ON-Line (FWD B) LED is blinking.	Perform the loopback test as described in Section 5.3.
The Bridge (code verification) LED remains OFF.	This is NOT a hardware fault indication. Check the position of configuration switch 1 and 5 (see Appendix A). Reset configuration switch 1 and 5 to the OFF position (up = OFF) and recycle the bridge power.

Table 5–4 (Cont.): Simple Troubleshooting

Symptom	Suggested Corrective Action
The Software (non-bridge code) LED is blinking.	This is NOT a hardware fault indication. Check the position of configuration switch 5 (see Appendix A). Reset configuration switch 5 to the OFF position (up = OFF) and recycle the bridge power.
The Link OK LED on the remote PCI device at Port B remains OFF.	Do the Following: ▪ Be sure that the fiber optic cables are properly connected to the bridge, and to the remote device at the other end of the link. If the cables are not connected properly, when you plug in the power cord the Link OK LED will not illuminate (indicating a link failure). ▪ Determine that the device at the other end of the link is installed and powered up. If the remote device at the other end of the link is not powered up, the Link OK LED will not illuminate (indicating a link failure) when you power up the bridge*. ▪ If you are installing a DEBAM-RC/RD model, check to see that the optical idle switches are set correctly (refer to Section 4.2.3). ▪ The cable plant may have insufficient optical loss, attenuator spacer/s may have to be installed (refer to Section 4.6). If the fault persists, more extensive troubleshooting is required. Perform the loopback test as described in Section 5.3.

*At power up the bridge's remote circuitry transmits signals and receives feedback from the remote bridge (or device) at the other end of the link. This is for checking the link state between the two remote devices. If the other remote device is NOT powered up, the bridge senses a link failure (no signal received) and extinguishes the Link OK LED (indicating a link failure). As soon as the device at the other end of the link is powered up (and transmitting signals), the bridge receives and acknowledges the feedback and illuminates the Link OK LED. Both bridges must be powered up in order to establish and confirm a link between the two devices.

5.3 Loopback Test

Use the following procedure to determine if the LAN Bridge 200 unit is faulty, or if the fault lies in the external cables or in the device the cables attach to.

1. Disconnect the LAN Bridge 200 power cord from the ac power source.
2. Set configuration switch 1 (Factory Mode Switch) to the ON position (down = ON).
3. Install all loopback connectors:
   - Port A — Install both, the AUI loopback connector and the ThinWire T-connector and terminators.
   - Port B (local bridge) — Install AUI loopback connector.
   - Port B (remote bridge) — Install fiber optic loopback connector.
4. Reconnect the LAN Bridge 200 power cord to the ac power source.
5. Observe the 2-second lamp check for LED validation, then wait 60 seconds for the diagnostic self-test to complete.
6. Observe the status of the following LEDs:
   - Self-Test OK (Logic Module) LED
   - Self-Test OK (Port B) LED
7. If both LEDs are ON, the LAN Bridge 200 unit is functioning properly and the fault lies in the external cables or in the device the cables attach to. Use the appropriate documentation to troubleshoot or replace the faulty cable or device.
8. If either LED is OFF (or if both are OFF), the LAN bridge 200 unit is faulty.

   Notify the system/network manager that the bridge must be returned to Digital for repair or replacement.
9. Disconnect the LAN Bridge 200 power cord from the ac power source.
10. Reset Configuration Switch 1 (Factory Mode Switch) to the OFF position (up = OFF).

A

Controls, Status LEDs, and Connectors

This appendix identifies and describes the LAN Bridge 200 controls, status LEDs, and connectors.

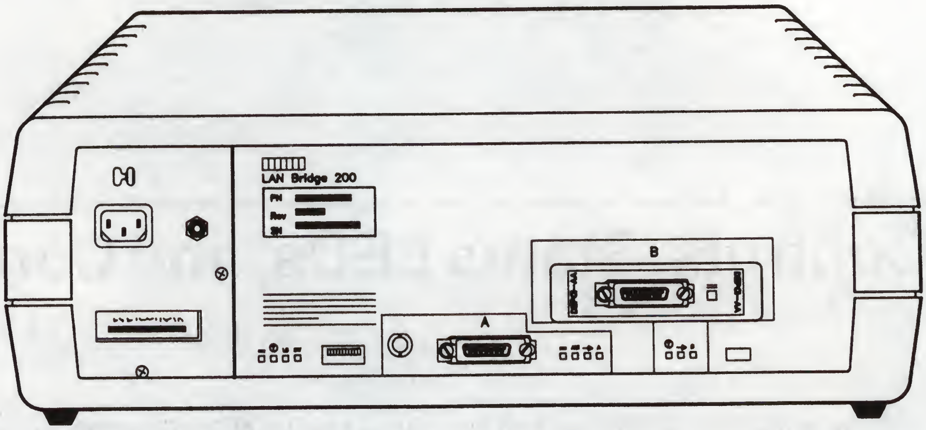
A.1 LAN Bridge 200 Unit I/O Panel

The I/O panel of the LAN Bridge 200 unit (see Figures A-1 and A-2), provides access to all controls, status LEDs, and connectors. There are no switches inside the bridge.

NOTE

Always place the bridge so that the I/O panel is visible. This allows you to monitor the bridge status LEDs.

Figure A–1: Local LAN Bridge 200 Unit I/O Panel



DEBAM–AA/AB

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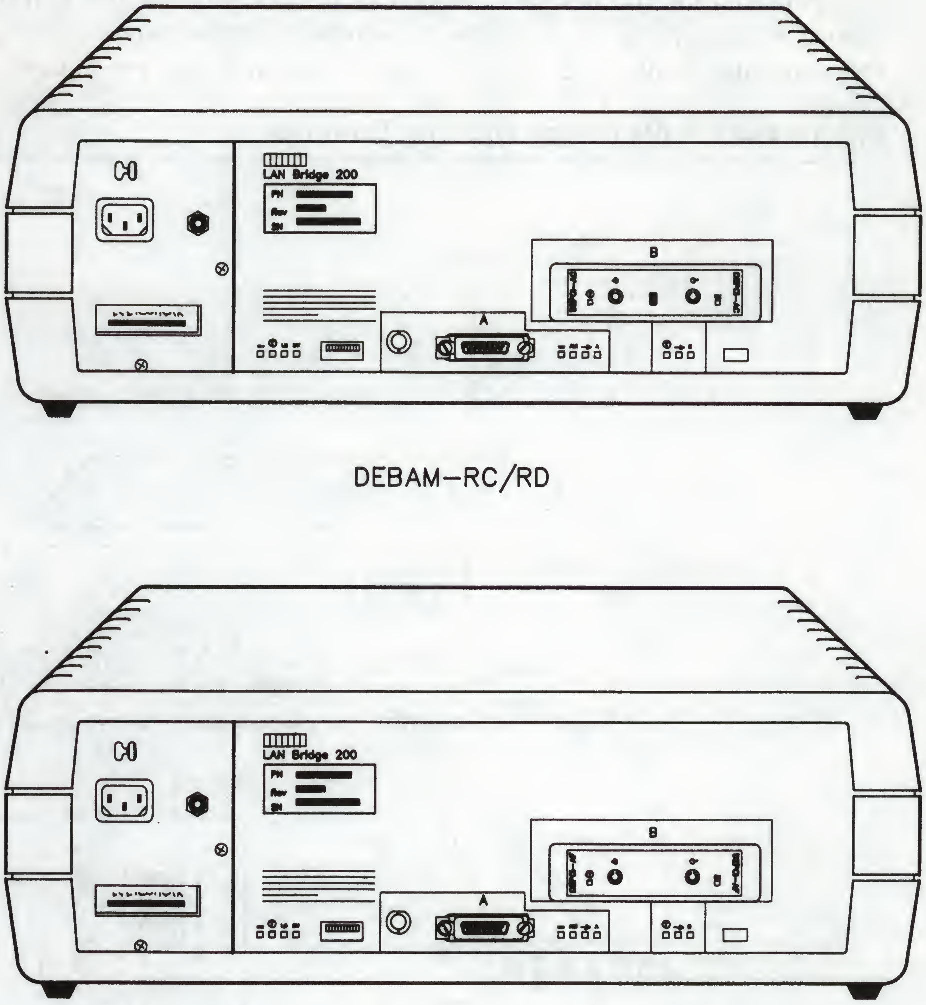
Figure A–2: Remote LAN Bridge 200 Unit I/O Panel



DEBAM–RC/RD

DEBAM–RF/RG

LKG–2423–88

A.2 Controls

The controls for the bridge (see Figure A–3), comprise the voltage select switch, circuit breaker, and configuration switches. Table A–1 provides a description of the controls. Table A–2 describes the function of the configuration switches.

Figure A–3: LAN Bridge 200 Unit Controls

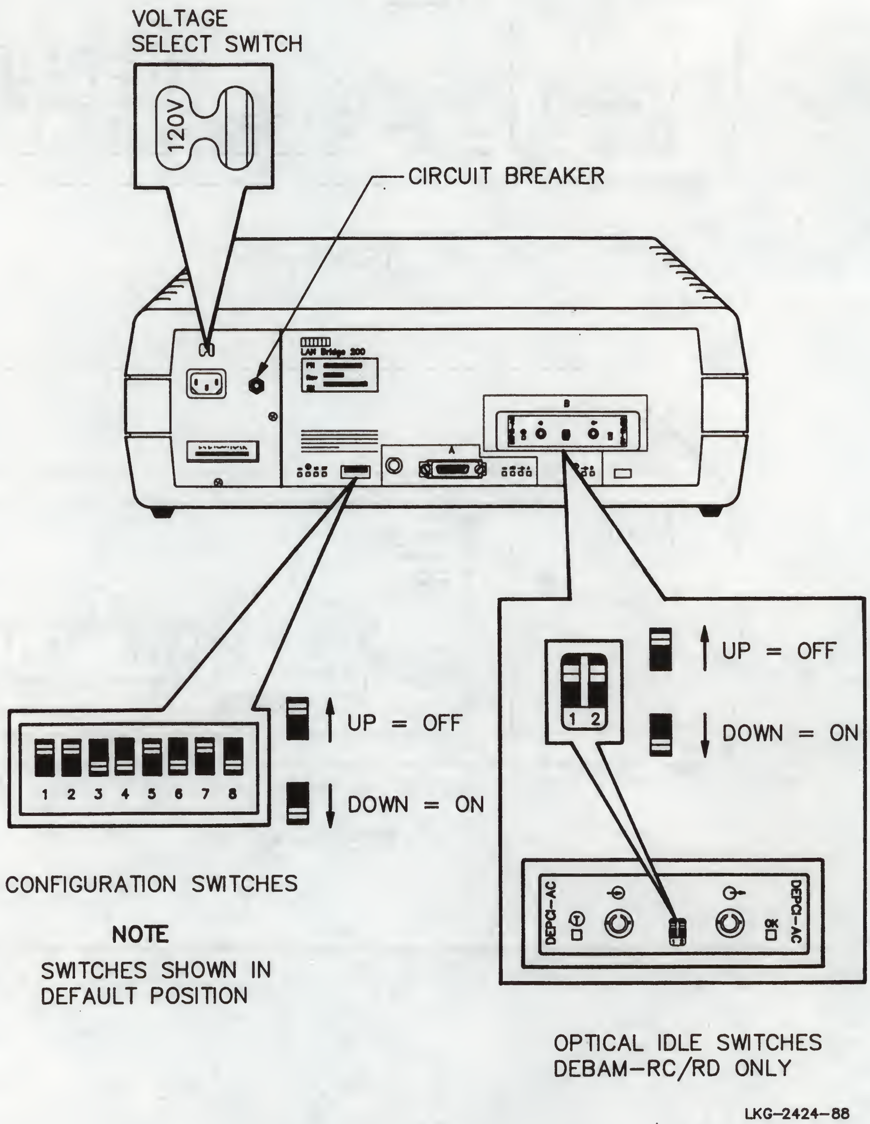


Table A–1: LAN Bridge 200 Unit Controls

Control	Description
Voltage Select Switch	Sets the bridge's ac input voltage to the range required for operation in your country. This switch was factory set for 120 Vac operation or 240 Vac operation, depending on the model number. Do not change this switch setting unless you are sure that the switch setting is incorrect (see your electrician if you are not sure). Section 4.2.1 provides information about changing the switch setting, if necessary.
Circuit Breaker	Provides overcurrent protection for the bridge. If an overcurrent condition causes the circuit breaker to trip, the white center portion of the circuit breaker pops out as a visual indication and the ac power is cut off from the bridge. The circuit breaker can be reset by pressing in on the white center portion.
Configuration Switches	These switches control the LAN Bridge 200 unit's functions. Each switch is described in Table A-2.

Table A–2: LAN Bridge 200 Unit Configuration Switch Functions

Switch Number	Name	ON (Down)	OFF (Up)
1	Factory Mode	For troubleshooting only (refer to Chapter 5).	Normal Mode — Must be in this position for correct bridge operation.
2	NVRAM Reset [1]	NVRAM resets to factory default settings when the bridge is powered up. NVRAM Reset removes all bridge management configuration changes.	Prevents NVRAM from resetting to factory default settings when the bridge is powered up. This setting should be used to prevent the loss of parameters stored by your bridge management software during a power failure.
3	Port A Access [2]	Network stations connected to Port A that have bridge management capabilities are allowed to read and write (modify) bridge management parameters.	Network stations connected to Port A that have bridge management capabilities are allowed to read but cannot write bridge management parameters.
4	Port B Access [2]	Network stations connected to Port B that have bridge management capabilities are allowed to read and write (modify) bridge management parameters.	Network stations connected to Port B that have bridge management capabilities are allowed to read but cannot write bridge management parameters.
5	Reserved For Future Use	N/A	Normal Mode — Must be in this position for correct bridge operation.
6	Bridge Mode	Normal Mode — Must be in this position for correct bridge operation.	N/A
7	Spare Switch — Not Assigned	N/A	N/A
8	AUI/ThinWire Mode Select	Selects AUI connection for Port A.	Selects ThinWire connection for Port A.

[1]Refer to Section A.2.1.
[2]Refer to Section A.2.2.

A.2.1 Resetting NVRAM

CAUTION

Resetting the NVRAM switch removes all bridge management set parameters and restores the NVRAM to factory set parameters. You should save all bridge management set parameters in a separate file to prevent their loss in the event of NVRAM failure or accidental resetting of the NVRAM switch.

You can change the switch settings for Port A and Port B Access while the bridge is operating. However, the switch setting for NVRAM Reset is read only during powerup. Changing the NVRAM Reset switch while the bridge is operating has no affect on bridge operation.

To change the NVRAM Reset switch setting, disconnect the bridge power cord from the ac power source, change the switch setting, then reconnect the bridge power cord.

A.2.2 Port Security

Port A and Port B Access switches can prevent bridge management software from changing any of the bridge's internal parameters.

If security is a concern at the site, set the bridge's parameters using your bridge management software, and then disable one or both ports by putting one or both switches in the up position (up = OFF). Bridge management software can still read the bridge's counters and other parameters.

Placing either Port Access switch in the down position (down = ON) allows bridge management software write access from stations on the LAN connected to that port of the bridge. Normally, both switches are placed in the down position to enable bridge management software write access from stations on either LAN.

Refer to the *Bridge and Extended LAN Reference* for more information about the use of this feature.

A.3 Local Bridge Status LEDs

The local LAN Bridge 200 unit (DEBAM-AA/AB) has 12 Status LEDs; 11 of the LEDs are located on the I/O panel, and the remaining LED is on the local PCI device at Port B (see Figure A–4). The local PCI device status LED states are described in Table A–3. The remaining status LEDs states are described in Table A–5.

Figure A–4: Local Bridge Status LEDs

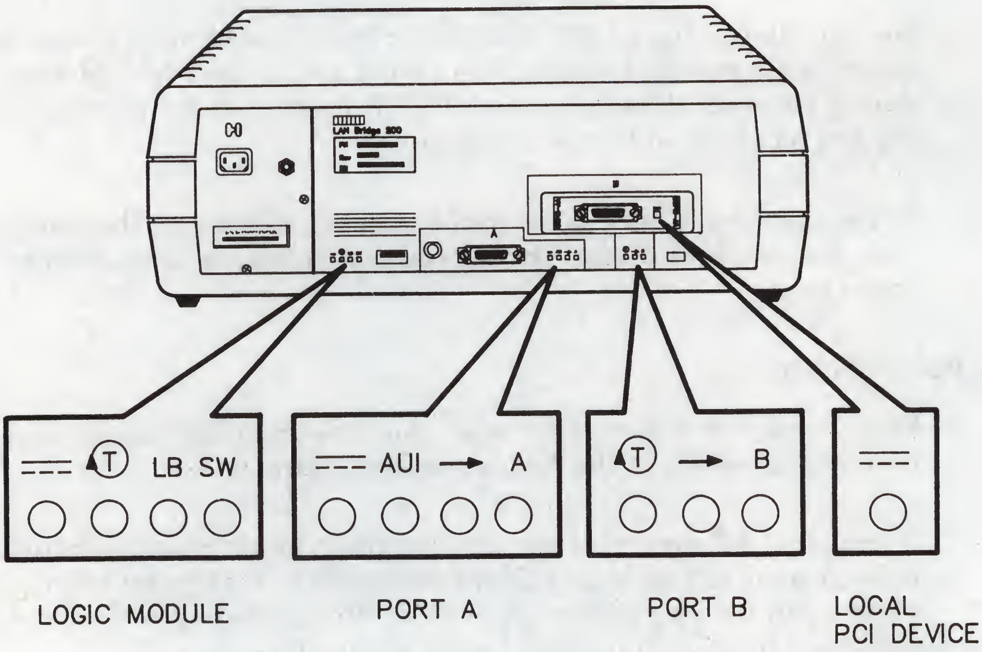


Table A–3: Local PCI Device Status LED

Symbol	LED Name	ON Steady	OFF	Blinking
$\overline{---}$	DC OK (Port B External)	Port B AUI transceiver power OK	Port B transceiver power failure	N/A

A.4 Remote Bridge Status LEDs

The remote LAN Bridge 200 unit (DEBAM-Rx) has 13 Status LEDs; 11 of the LEDs are located on the I/O panel, and the 2 remaining LEDs are on the remote PCI device at Port B (see Figure A–5). The remote PCI device status LEDs states are described in Table A–4. The remaining status LEDs states are described in Table A–5.

Figure A–5: Remote Bridge Status LEDs

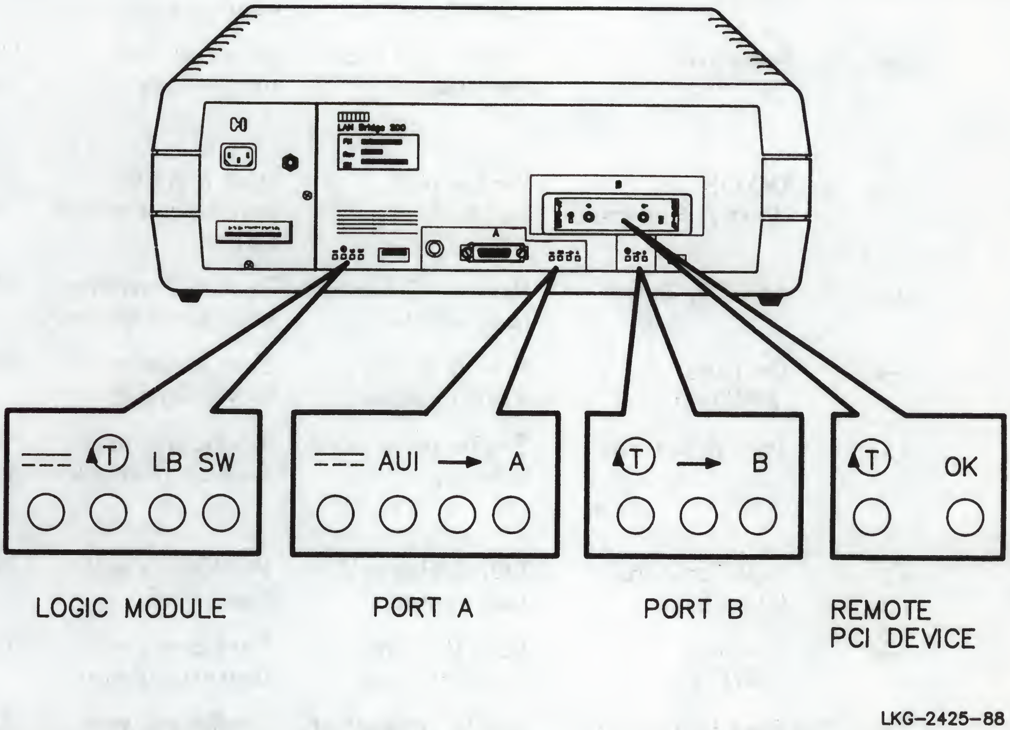


Table A–4: Remote PCI Device Status LEDs

Symbol	LED Name	ON Steady	OFF	Blinking
T	Self-Test OK (PCI Device)	PCI device self-test passed	PCI device self-test failed	N/A
OK	Link OK	Fiber optic link OK	Fiber optic link failed	N/A

Table A–5: I/O Panel Status LEDs

Symbol	LED Name	ON Steady	OFF	Blinking
⎓	DC OK (Logic Module)	Logic Module DC power valid	Logic Module DC power failure	N/A
T	Self-Test OK (Logic Module)	Logic Module self-test passed	Logic Module self-test failed	NVRAM failed (may require replacement)
LB	Bridge	Bridge code operational	Bridge code non-operational	N/A
SW	Software	Non-bridge code operational	No valid non-bridge code	Down-line load in progress
⎓	DC OK (Port A External)	Port A AUI transceiver power OK	Port A AUI transceiver power failure	N/A
AUI	AUI/TW Select	Port A AUI interface selected	Port A ThinWire interface selected	N/A
→	On-Line (FWD A)	Port A in forwarding state	Port A not in forwarding state	Fault Indication
A	Port A Activity	Traffic present on network	Traffic not present on network	Traffic present on network
T	Self-Test OK (Port B)	PCI device self-test passed	PCI device self-test failed	N/A
→	On-Line (FWD B)	Port B in forwarding state	Port B not in forwarding state	Fault Indication
B	Port B Activity	Traffic present on network	Traffic not present on network	Traffic present on network

A.5 Ports and Connectors

Figure A–6 shows the locations of the ports and connectors used on both versions of the LAN Bridge 200 unit. Table A–6 describes the functions of the individual ports and connectors.

Figure A–6: LAN Bridge 200 Unit Ports and Connectors

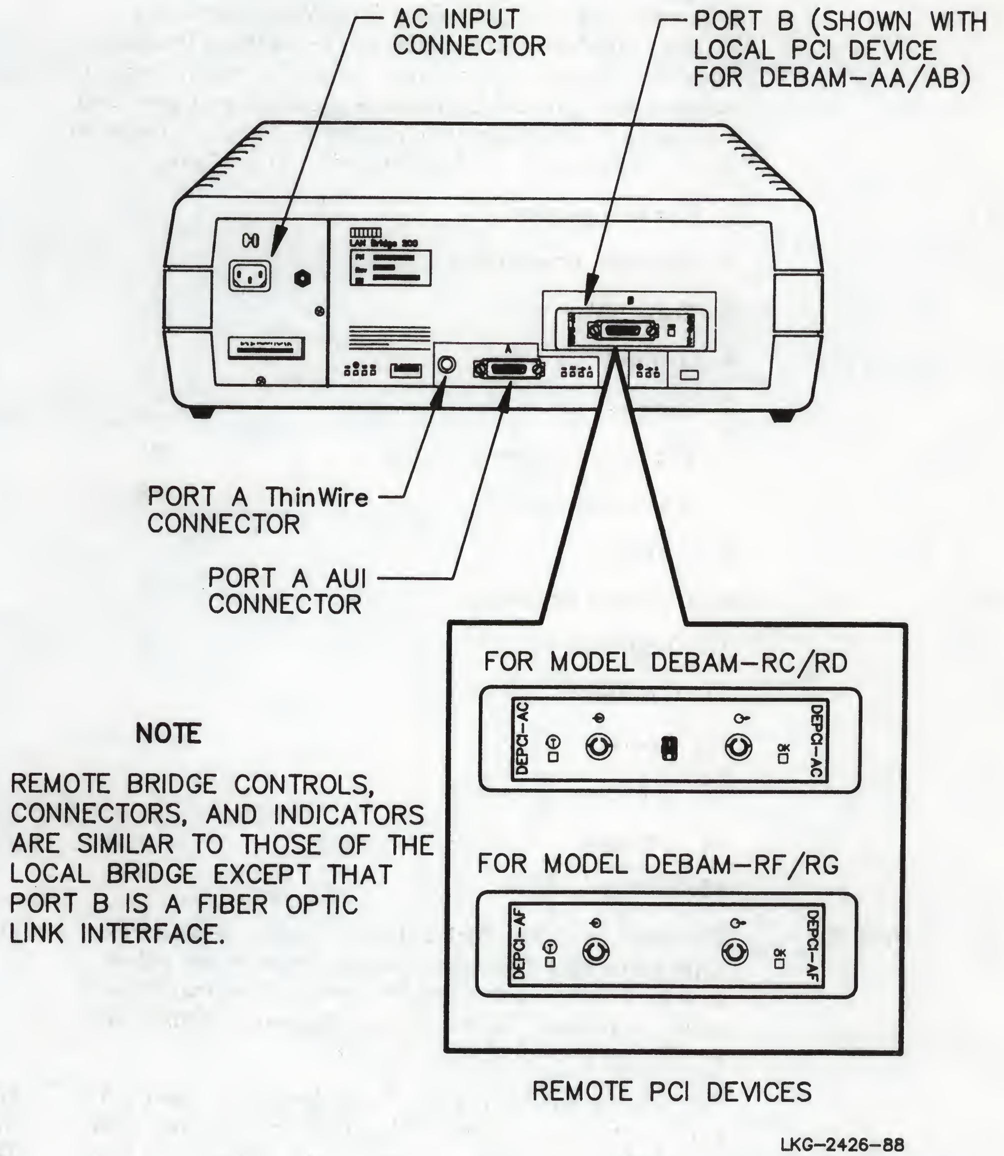


Table A–6: LAN Bridge 200 Unit Ports and Connectors

Connector	Description	Model
AC Input	Accepts ac input voltages of 120 or 240 Vac depending on the setting of the voltage selection switch (refer to Table A-1).	All models
Port A	Provides both a standard AUI transceiver interface (15-pin, female, D-type connector) and a ThinWire Ethernet network interface (ThinWire connector). Either interface can be selected by setting the configuration switch to the appropriate position (refer to Table A–2). The AUI interface connector is provided with a slide latch for locking the transceiver cable in place. The pins have the following definitions: 1. Chassis ground 2. Collision presence + 3. Transmit + 4. Ground 5. Receive + 6. Transceiver power return 7. No connection 8. Ground 9. Collision presence - 10. Transmit - 11. Ground 12. Receive - 13. Transceiver power 14. Ground 15. Ground	All models
Port B	For local bridges, Port B has a 15-pin, female, D-type connector for connecting a transceiver cable. A slide latch is provided for locking the transceiver cable in place. The pins have the same definitions as for the Port A AUI interface.	DEBAM-AA/AB
	For remote bridges, Port B has two fiber optic ST-type connectors. The left-hand connector (marked) is for receiving optical signals. The right-hand connector (marked) is for transmitting optical signals.	DEBAM-RC/RD and DEBAM-RF/RG

B

LAN Bridge 200 Specifications

This appendix lists the specifications for the LAN Bridge 200 product.

B.1 Physical Dimensions

The bridge's plastic enclosure can be easily removed for mounting the unit in a standard 48-centimeter (19-inch) RETMA rack cabinet (mounting brackets are provided). An optional kit (Order Code H039) is available for mounting the bridge on a wall or partition without removing the plastic enclosure.

Dimension	With Enclosure	Without Enclosure
Height	16.2 cm (6.4 in)	13.3 cm (5.3 in)
Width	49.4 cm (19.4 in)	43.6 cm (17.2 in)
Depth	31.3 cm (12.3 in)	29.8 cm (11.7 in)
Weight	7.3 kg (16.0 lb)	5.2 kg (11.5 lb)

B.2 Environmental Requirements

The LAN Bridge 200 product is designed to operate in a non-airconditioned environment or in an exposed area of an industrial site. However, 50° C (122° F) is the maximum ambient temperature allowable at the air intake of the bridge. This applies even when the LAN Bridge 200 unit is mounted in a cabinet. The bridge is not intended to operate in an air plenum.

Parameter	Minimum	Maximum
Temperature		
Operating	5° C (41° F)	50° C (122° F)
Non-operating	-40° C (-40° F)	66° C (151° F)
Maximum temperature change per hour	—	20° C (36° F)
Altitude		
Operating	—	2.4 km (8000 ft)
Non-operating	—	9.1 km (30,000 ft)
Relative Humidity		
Operating (noncondensing)	10%	95%
Non-operating (noncondensing)	0%	95%
Wet-bulb temperature (operating)	—	32° C (90° F)
Dew point (operating)	—	2° C (36° F)
Air flow *	70.0 CFM	—

*A minimum of 10 cm (4 in) of space must be provided on both ends of the unit for adequate air flow.

B.3 Fiber Optic Specifications

To obtain maximum transmission distances, or to extend an existing link, careful attention must be paid to the total optical loss of the cable plant. High-quality cables, connectors and splices are strongly recommended. Any cable plant, long or short, should be similar with respect to fiber type. Mixing fiber types usually results in very high losses and is not recommended.

New installations should be wired with 62.5/125 micron Graded Index Multimode Optical Fiber conforming to Digital Equipment Corporation's General Specification 1710002-GS. Other optical fiber sizes can be used but can result in lower maximum transmission distances. Your cable installer should provide proof of compliance.

The following sections provide maximum transmission distances obtainable by the LAN Bridge 200 unit when various types of optical fiber are used.

B.3.1 DEBAM-RC/RD-to-DEBAM-RC/RD Links

The DEBAM-RC/RD uses 850 nanometers wavelength LED transmitters and was designed to support 50, 62.5, 85 and 100 micron core fiber types. A maximum distance of 3 kilometers (1.9 miles) using 62.5 fiber is possible between two DEBAM-RC/RD models.

Fiber Size	Wavelength	Maximum Distance	Loss Budget	Minimum Attenuation
50/125	850 nm	2.0 km (1.3 mi)	9 dB	N/A
62.5/125	850 nm	3.0 km (1.9 mi)	14 dB	N/A
85.0/125	850 nm	2.8 km (1.7 mi)	15 dB	N/A
100/140	850 nm	2.8 km (1.7 mi)	16 dB	4 dB

B.3.2 DEBAM-RC/RD-to-Remote Repeater (DEREN-RC/RD) Links

Ethernet timing requirements restrict distances between a bridge and a repeater to a maximum of 1.5 kilometers (0.93 miles).

Fiber Size	Wavelength	Maximum Distance	Loss Budget	Minimum Attenuation
50/125	850 nm	1.5 km (0.93 mi)	9 dB	N/A
62.5/125	850 nm	1.5 km (0.93 mi)	14 dB	N/A
85.0/125	850 nm	1.5 km (0.93 mi)	15 dB	N/A
100/140	850 nm	1.5 km (0.93 mi)	16 dB	4 dB

B.3.3 DEBAM-RF/RG-to-DEBAM-RF/RG Links

The DEBAM-RF/RG uses 1300 nanometers wavelength LED transmitters and was designed for use with 62.5/125 micron Graded Index Multimode Optical Fiber conforming to Digital Equipment Corporation General Specification 1710002-GS. A maximum distance of 10 kilometers (6.2 miles) can be supported on 62.5 micron core fiber. Other optical fiber sizes can be used but can result in lower maximum transmission distances.

Fiber Size	Wavelength	Maximum Distance	Loss Budget	Minimum Attenuation
50/125	1300 nm	10.0 km (6.2 mi)	12 dB	3 dB
62.5/125	1300 nm	10.0 km (6.2 mi)	17 dB	7 dB
85.0/125	1300 nm	4.0 km (2.5 mi)	17 dB	9 dB
100/140	1300 nm	4.0 km (2.5 mi)	17 dB	9 dB

B.3.4 DEBAM-RC/RD Fiber Cable Measurement Correction

The values in this table are used to correct the measured loss of an optical fiber when using the equipment and procedure specified in Section 9.5.1 of the *DECconnect System Facilities Cabling Installation Guide*. The correction is required to account for the difference in wavelength between the DEBAM-RC/RD transmitter and the test equipment transmitter.

Wavelength	Correction Value
790 nm	-0.2 dB/km
795 nm	-0.1 dB/km
800 nm	0 dB/km
805 nm	0.1 dB/km
810 nm	0.2 dB/km
815 nm	0.3 dB/km
820 nm	0.4 dB/km
825 nm	0.5 dB/km
830 nm	0.6 dB/km
835 nm	0.65 dB/km
840 nm	0.7 dB/km
845 nm	0.8 dB/km
850 nm	0.9 dB/km

B.3.5 Fiber Optic Connectors

The LAN Bridge 200 remote units are provided with ST-type transmit and receive connectors (see below) at the remote PCI device. ST-type connectors are also required on the fiber optic cables to make the connection.

CAUTION

Your cable installer should verify that the ferrule on the transmit end of the fiber optic cable's connector measures 7.87 mm ± .025 mm (.310 in ± .001 in) in length. Ferrules that are shorter may cause less power to be launched into the fiber.

Quantity	Connector Type	Maximum Attenuation
2	ST (2.5 mm [.10 in])	Less than 1.0 dB

B.4 Power Requirements

Parameter	120 Vac Operation DEBAM-AA/RC/RF	240 Vac Operation DEBAM-AB/RD/RG
Voltage	90 Vac to 128 Vac	190 Vac to 256 Vac
Line Current	2.3 amps	1.2 amps
Frequency	47 to 63 Hz	47 to 63 Hz
Power Consumption	230 watts	230 watts
Heat Dissipation	275 BTU/hr	275 BTU/hr

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